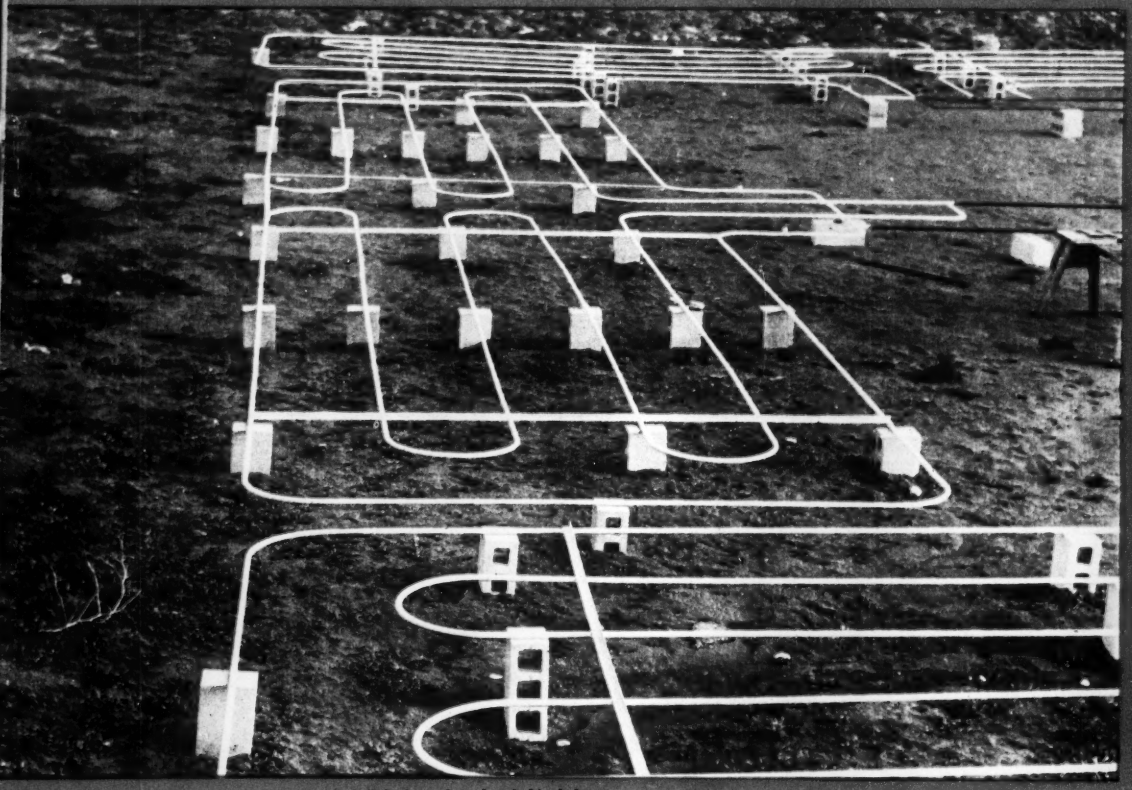
Heating Piping & Air Conditioning

DESIGN
INSTALLATION
OPERATION
MAINTENANCE

SEPTEMBER ★ 1952

INDUSTRIAL
COMMERCIAL
INSTITUTIONAL AND
PUBLIC BUILDINGS

Page 119—Journal Section of The American Society of Heating and Ventilating Engineers



"Lake" is heated to hatch black bass ..... *page 75*

Central Coolant Piping Has Advantages . . 98

Radiant Heating and Cooling . 88

"World's Largest" Air Conditioning 102

Complete Contents of This Issue . . . 5

DO RADIOACTIVE WASTES CONTAMINATE PIPING? 80

FOR CLASSY SHOPS

. . . OR BUSY PLANTS

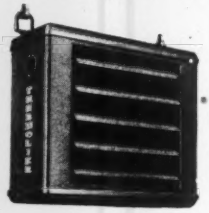
THERMOLIER UNIT HEATERS

The condensed table below is a quick guide to the selection of the correct Thermolier for specific conditions. The capacities, when motors are operating at normal speeds, are based on Standard Basis of Rating: 2 lb. steam pressure and 60° F entering air temperature.

Grinnell Thermoliers are tested and they are rated in strict accordance with rules of the Industrial Unit Heaters Association.

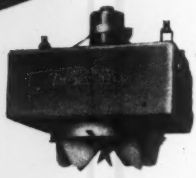
All Thermoliers can be operated at working steam pressures up to 125 psi and steam temp. up to 406° F.

A MODEL AND SIZE FOR EVERY PURPOSE

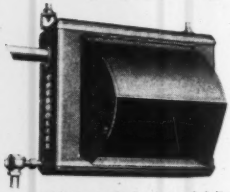


horizontal delivery

textile (horizontal delivery)



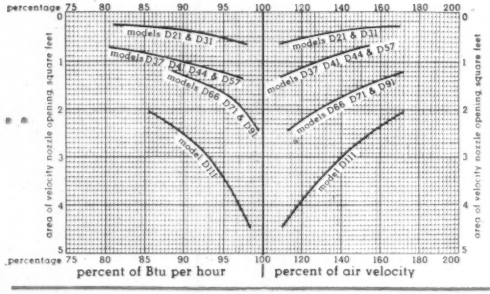
vertical delivery



velocity nozzle (horizontal delivery)

model	total heat delivered, Btu per hr	sq ft edr (nominal)	air velocity at exit, louvers open, lin. ft. per min.
horizontal delivery			
D21	35,600	148	786
D31	48,700	203	851
D37	62,200	259	753
D41	71,000	295	901
D44	84,100	350	887
D57	101,300	422	1016
D66	128,700	536	779
D71	151,700	632	977
D91	196,000	817	985
D111	275,300	1147	1048
Textile			
TX70	69,800	291	826
TX110	113,700	474	877
vertical delivery			
VA1042	50,800	212	1399
VA1045	73,600	307	1287
VA1065	109,400	456	1354
VA1075	145,600	607	1231
VA1101	185,000	770	1495
VA1111	257,000	1071	1631

performance with velocity nozzle ▶


percentage 75 80 85 90 95 100 120 140 160 180 200
models D21 & D31
models D37, D41, D44 & D57
models D66, D71 & D91
model D111
area of velocity nozzle opening square feet
percent of Btu per hour
percent of air velocity

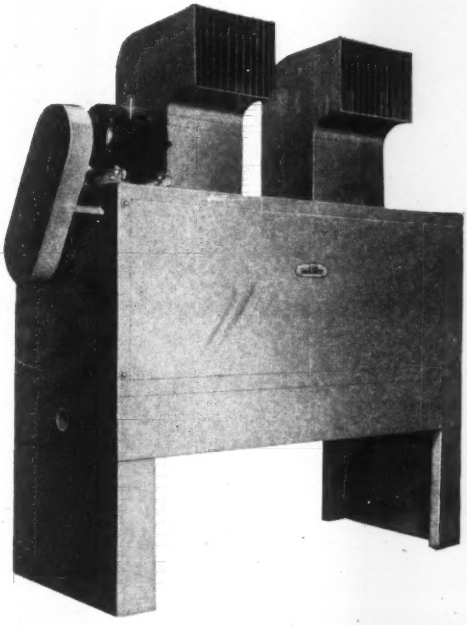
GRINNELL

THERMOLIER UNIT HEATERS

CALL YOUR LOCAL GRINNELL DISTRIBUTOR

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports
Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems



Building Block Construction Feature of New usAIRco Heating and Ventilating Unit

Uunlimited number of arrangements possible for floor, horizontal suspended, wall or inverted suspended mounting

The all around adaptability of usAIRco's new Blower Type Heating and Ventilating Unit makes it an ideal installation for warehouses, factories and garages . . . or any type of building where large volumes of air must be heated and distributed uniformly.

Unit may be specified with any combination of the following standard sections: blower, face and bypass, coil, filter and mixing chamber sections.

usAIRco's BH Type Heaters give you greater service at maximum economy because: Blower Section has forward curved centrifugal blowers for high efficiency and noiseless operation; Coil Section is of heavy gauge steel, and can be turned end for end to fit any problem. Hot water, steam, or steam distributing tube coils are available. The completely sectional construction means easy installation, trouble-free maintenance.

The new usAIRco BH Type Units are available in 8 sizes: 1000 to 33,000 CFM.

See your nearest usAIRco agent or write to Dept. HP 952

UNITED STATES AIR CONDITIONING CORPORATION

3300 Como Ave. S. E. • Minneapolis 14, Minn.

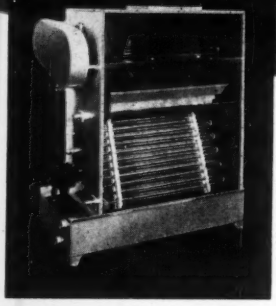
usAIRco AGENTS

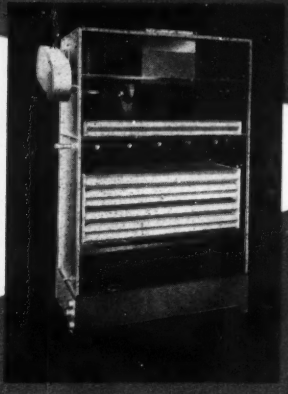
Alabama, Birmingham—Brownlee-Morrow Engineering Co. 745 N. 44th St.
California, Los Angeles 7—Harry F. Haldeman, Inc. 2401 South Hill Street
San Francisco 7—Refrig. & Power Spec. Co. 380 Brannan Street
Colorado, Denver—George G. Miller 4001 Alcott St.
D. C., Washington—George F. Miller 1902 L Street, N. W.
Florida, Jacksonville—Florida Air Control Co. 824 West Bay Street
Georgia, Atlanta—William F. Applegarth 426 W. Peachtree N. W.
Idaho, Boise—Thermal Engineering Co., 1301 Wilson
Illinois, Chicago 1—E. J. Conley Company 35 East Wacker Drive
Rockford—R. E. Burden, 6610 North Second
Iowa, Des Moines—R. G. Siple, 214 Plymouth Bldg.
Louisiana, New Orleans—Lamatt Agency, Inc. 840 Baronne Street
Maryland, Baltimore—The Dexter Co. 2021 Maryland Ave.
Massachusetts, Wakefield—E. A. Seeley, Inc. 116 Foundry Street
Michigan, Detroit 11—J. H. Keller Company 2832 E. Grand Boulevard
Kalamazoo—J. Daniel Rupert 2540 Wellington Road
Minnesota, Minneapolis 2—George Mellema Co. 620 Plymouth Building
Mississippi, Jackson—Lamatt Agency, Inc. 2840 Arbor Hills Drive
Missouri, St. Louis 17—T. J. Waddell 1110 So. Brentwood Blvd.
Montana, Billings—Leder Wyomont Supply Co. 234 Stapleton Building
Nebraska, Omaha—Ak-Sar-Ben Sales Co. 1309 Leavenworth Street
New Jersey, Newark 2—Air & Heat Company 1060 Broad Street
New Mexico, Albuquerque—Air Equipment Co. 1607 North 2nd Street
New York, Albany—Avery M. Walsh & Sons P. O. Box 974
Buffalo 17—R. C. Chelius 31 Palmer Avenue, Kenmore
New York City 17—Air & Heat Company 420 Lexington Avenue
Syracuse—Avery M. Walsh & Sons, Box 502
North Carolina, Charlotte—Charles M. Setzer Co. P. O. Box 1867
Marion—Charles M. Setzer Co., P. O. Box 623
Ohio, Cincinnati 12—B. E. Culbertson Co. 626 Broadway
Cleveland 2—T. R. Eberwine Co. 13231 Euclid Avenue
Oklahoma, Oklahoma City—Don R. Groth 342 Oklahoma Natural Building
Oregon, Portland—H. K. Mead 317 S. W. Alder Street, Room 1100
Pennsylvania, Harrisburgh—Thermal Spec. Co. 212 Locust Street
Philadelphia 3—Malloy & Company Broad Street Station Building
Wilkes-Barre—Luzerne & Lackawanna Supply 20 N. Pennsylvania Avenue
South Carolina, Greenville—Charles M. Setzer Co. P. O. Box 203
Tennessee, Memphis—Lamatt Agency, Inc. 1482 Madison Street
Nashville—Reube O. Emery Third National Bank Building
Texas, Dallas—Buffalo Engineering Company 3409 Oaklawn Ave.
Fort Worth 2—J. D. Higgins Co. 822 Neil P. Anderson Building
Houston 6—Jack Thomas Davis 3303 Montrose Boulevard
San Antonio—R. M. Dawson 516 Maverick Building
Utah, Salt Lake City—Thermal Engineering Co. 1672 East 13th Street
Virginia, Richmond—American Sales Engineers 1222 Bainbridge Street
Washington, Seattle—George E. Mead Company 501 Arctic Building
Spokane—Francis J. Fallquist, 507 Kuhn Bldg.
West Virginia, Charleston—Allegheny Equip't Co. 715 Richard Street and NYCRR
Wisconsin, Milwaukee 11—Joseph S. Babush Co. 2401 North Maryland Avenue
Canada, Toronto—Creamery Package Mfg. Co. of Canada, Ltd. 267 King Street
Honolulu, Hawaii—H. Z. Colvin 1325 Kamaile Street
Export Department—13 East 40th St. New York 16, N. Y.
Packaged Refrigeration—Eastern Sales Division Tanner-Hall, Inc., 252 No. 11th St. Phila. 7, Pa.

Save both ways . . .

IN INSTALLATION COSTS · IN OPERATING COSTS

EVAPORATIVE CONDENSERS · COOLING TOWERS



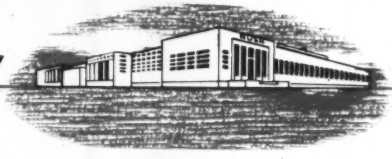


ative Condensers and Cooling Towers offer the
lan the important "extras", in many ways, extras
ne job . . . increase your profit.

, low head room required and small floor
zed cases in larger units permit move
ays eliminating costly re-building
ted for maximum efficiency re
machine efficiency at lo
Bulletin 510 des
the Bush
(5 to 75 tons) you'll understand why, in all ways, the Best is Bush.

Bush Manufacturing Company

WEST HARTFORD 10, CONNECTICUT



Since 1907

Heating Piping & Air Conditioning

Vol. 24 No. 9

SEPTEMBER 1952

(with which is merged the Aerologist)

DESIGN, INSTALLATION, OPERATION AND MAINTENANCE IN INDUSTRIAL, COMMERCIAL, INSTITUTIONAL AND PUBLIC BUILDINGS

BOARD OF CONSULTING AND CONTRIBUTING EDITORS . . . .

N. R. Bernz, Leo F. Collins, Sabin Crocker, R. C. Doremus, Philip Drinker, M. K. Fahnestock, Walter L. Fleisher, F. E. Giesecke, William Goodman, William A. Hanley, J. J. Harman, G. W. Hauck, R. S. Hawley, E. P. Heckel, R. E. Hieronymus, J. C. Hornung, Lee P. Hynes, C. W. Kimball, Dwight D. Kimball, A. C. Kirkwood, Charles S. Leopold, Samuel R. Lewis, H. C. Murphy, Alfred J. Offner, F. B. Rowley, Robert P. Schoenijahn, Kalman Steiner, T. S. Tenney, Rush D. Touton, Eph. A. Tyler, W. H. Wilson

EDITORIAL DIRECTOR . . . . C. M. BURNAM, JR.

ASSOCIATE EDITOR . . . . THOMAS V. JOHNSON

ASSISTANT EDITOR . . . . AILEEN H. BURNS

EDITORIAL ASSISTANTS . . . . LOUISE THOMAS and BARBARA BURKHARTSMEIER

ADVERTISING STAFF . . . .

Wallace J. Osborn and Robert J. Osborn, New York—Murray Hill 9-8293 . . . . Robert A. Jack, Cleveland—Evergreen 2-1840 . . . . James D. Thomas and George C. Cutler, Chicago—State 2-6916 . . . . R. P. Wettstein, Los Angeles—Dunkirk 8-2286, Portland—Atwater 4107, San Francisco—Yukon 6-2522

PUBLISHER . . . . FRANK P. KEENEY

MANAGER . . . . CHARLES E. PRICE

CIRCULATION DIRECTOR . . . . FRANK S. EASTER

PRODUCTION MANAGER . . LAWRENCE A. DOYLE

Published monthly by the Keeney Publishing Co., 6 N. Michigan Ave., Chicago 2, Ill. Telephone: STate 2-6916. Subscriptions: U.S. and possessions, $3.00 per year; Canada, Cuba, Mexico, Central America, South America, $4.00 per year; other, $6.00. Current copies, U.S. and possessions, 35c each; back copies, 60c each. January 1952 issue unavailable. For change of address, notify publisher and your local postoffice of both old and new addresses by the 15th of the preceding month. Member Audit Bureau of Circulations and Associated Business Publications, Inc. Heating, Piping & Air Conditioning is indexed regularly by Engineering Index, Inc.

Copyright 1952 by the Keeney Publishing Co.

Entered as Second Class Matter May 18, 1929 at the Post office at Chicago, Ill., U.S.A. under the Act of March 3, 1879. Additional entry at Mendota, Ill.

Features

Lake Is Heated To Hatch Fish ... 75
Townsend Miller

Low Humidities for Testing Concrete ... 77
George V. Zintel

Atomic Heating Plant's Heat Exchanger ... 79
7 Million Btu Output

Radioactive Wastes Contaminate Piping ... 80
Albert P. Talboys

Unbalanced System Impairs Pump Operation ... 84
Harold A. Lockhart and Louis Oosten

Radiant Heating and Cooling ... 88
Gunnar Frenger and Dudley W. Day

Dual Valves Solve Plant Maintenance Problem ... 92
G. W. Hauck

Preventing Deterioration of Materials ... 93
Centralized data

Navy's "Mothball Fleet" Pays Off ... 94
Albert S. Gates, Jr.

Central Coolant Piping Has Advantages ... 98
James C. Bishop

World's Largest" Conditioned Hotel ... 102
H. J. Lohrman

"World's Largest" Commercial A. C. Project ... 105
Gateway Center

Code for Pressure Piping ... 107
New interpretations

What's Status of District Steam? ... 108
John F. Collins, Jr.

The Hartford Loop Connection ... 111
For steam boilers

Underground Vaults Conditioned ... 112
Howard Earl

Controlling Industrial Air Pollution ... 114
Harry E. Clo

Departments

The Editor's Pages ... 67
News and notes

"Open for Discussion" ... 71
Comment and criticism

Question of the Month ... 113
Add summer cooling?

Data Sheet ... 116
Dust collector performance

The Law and Your Profits ... 117
William Hurd Hillyer

Sam Lewis' Page ... 118
Returning condensate

Equipment Developments ... 189
New products

Who's What ... 224
Names in the news

Meetings and Conventions ... 238
Coming events

New Books and Reports ... 244
Information sources

Recent Trade Literature ... 248
Manufacturers offer data

Index to Advertisers ... 264
In this issue

ASHVE Journal Section

Tropical Housing Research Studies ... 119
W. R. Woolrich

Standards of Temperature ... 122

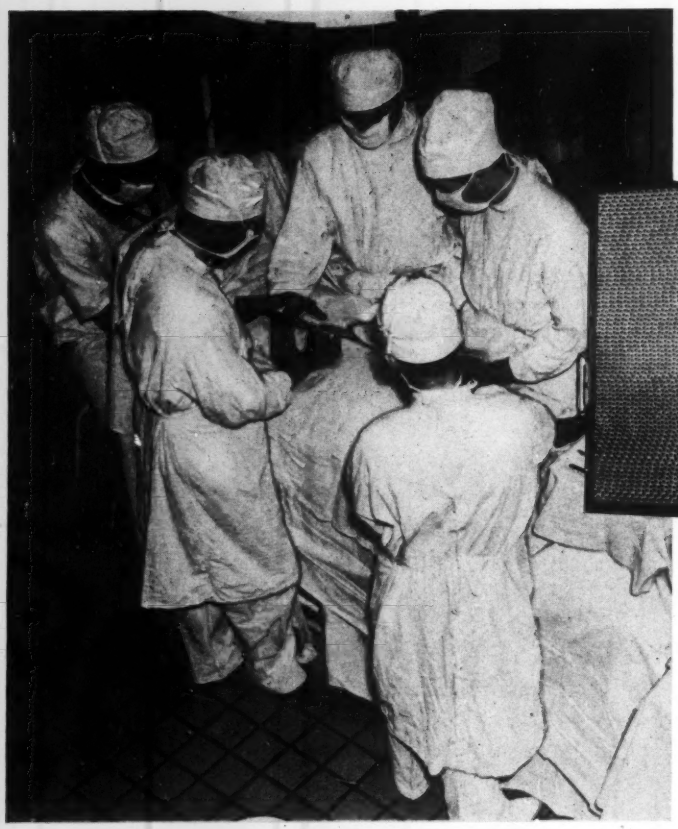
ASHVE Research Facilities on Busy Schedule ... 124
I. W. Cotton

Let's Go to Chicago ... 125

Summary of Chapter Meetings ... 127

Candidates for Membership ... 128

Officers, Council and Committees ... 131



Rx for Doctors

RECENTLY the maintenance engineer of a large hospital experienced a serious case of filter cloggitus. He was having no end of trouble in continuing to supply fresh air to the laboratories. He thought Far-Air* filters might correct the difficulty but hesitated to prescribe them without previous experience with this filter, as the staff of doctors would be highly critical if there were any noticeable decrease in filtering efficiency.

A comparative filter efficiency test was made in the hospital's air conditioning system. It proved that Far-Air filters would operate twice as long between cleanings and with less pressure loss. Also, only two-thirds the number of filters would clean twice as much air... a combined efficiency of better than 4 to 1!

A Far-Air filter installation was made, the operation was a success, and this air conditioning system recovered to the complete satisfaction of all concerned.

Qualified Far-Air engineers are available in your territory to aid you in properly solving your air cleaning problems. Write for information to Farr Company, P.O. Box 10187, Airport Station, Los Angeles 45, California.

FAR-AIR FILTERS

"Better by Farr"

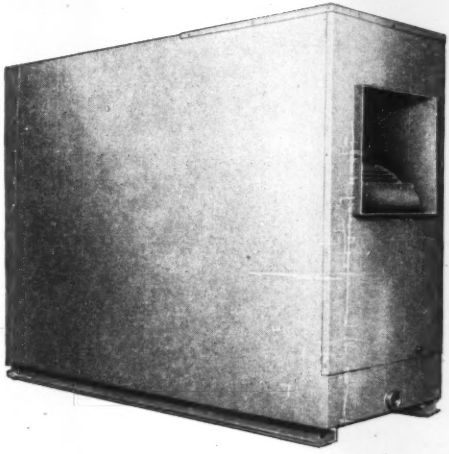
*Trade Mark Reg.

FARR COMPANY *Manufacturing Engineers*

Los Angeles • Chicago • New York

Mf'd under license by Control Equipment Co., Ltd., Montreal, Canada

IT'S NEW...IT'S LOW COST...IT'S A QUALITY TOWER...
FOR INDOOR OR OUTDOOR COOLING!



Pritchard Series "PB"
COTOPACK* COOLING TOWERS

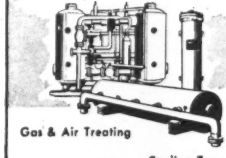
Check These Advantages!

- ✓ Centrifugal Blower is corrosion-proof coated, dynamically balanced for quiet operation, high capacity, low horsepower, longer life.
- ✓ All joints are welded watertight.
- ✓ Self cleaning, gravity-type distribution.
- ✓ Totally enclosed motor with belt tension adjustment.
- ✓ Fully guaranteed workmanship and materials.

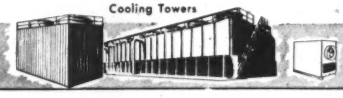
The new, better-than-ever Pritchard Series "PB" COTOPACK* Cooling Towers provide lower cost indoor or outdoor cooling service on air conditioning and refrigeration installations requiring from 6 to 20 tons capacity. Only highest quality materials . . . steel frame sheathing and long-life, removable Redwood decking. Shipped completely assembled. Easily installed. Never before has such quality been offered in a low cost tower! Get all the facts today!

*Registered Trade Name

Write for Bulletin No. 5.6.082A Today!


Gas & Air Treating

Specialized Heat Exchangers


Cooling Towers

Producers of QUALITY Specialized Process EQUIPMENT

J.F. Pritchard & Co.

EQUIPMENT DIVISION

Dept. No. 170 — 908 Grand Ave., Kansas City 6, Mo.

District Offices: CHICAGO • HOUSTON • NEW YORK • PITTSBURGH
TULSA • ST. LOUIS • Representatives in Principal Cities from Coast to Coast

...with air-conditioning and refrigeration controlled throughout by ALCO VALVES

990 ft. from stem to stem, the United States carries 2,000 passengers in luxury and safety. She's the first big ship ever built that is completely air-conditioned and fireproof.

In choosing valves to control her vast air-conditioning and refrigeration systems, wise engineers turned to ALCO. The reason: ALCO VALVES assure the dependable, trouble-free service required of equipment that serves at sea.

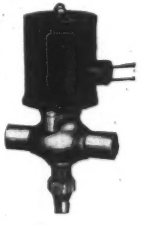
SEE YOUR ALCO WHOLESALER

There's a trouble-free ALCO VALVE for every application...large or small

THERMOSTATIC EXPANSION VALVES—Single or multi-outlet. For automatic liquid refrigerant control in all types of air-conditioning and refrigeration systems.

EVAPORATOR PRESSURE REGULATORS—Maintain constant evaporator pressure regardless of sudden load changes.

SOLENOID VALVES
Tight seating and packless. Moisture-proof to stop coil burn-outs.



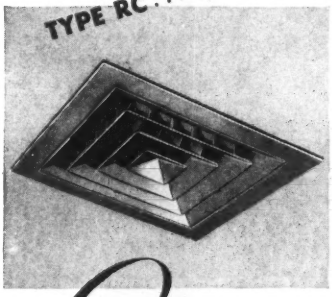
ALCO

ALCO VALVE CO.
861 KINGSLAND AVE. • ST. LOUIS 5, MO.

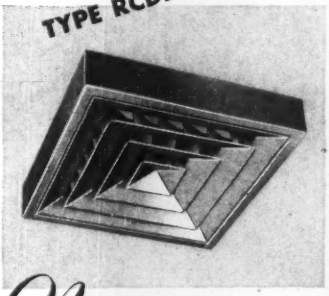
Designers and Manufacturers of Thermostatic Expansion Valves; Evaporator Pressure Regulators; Solenoid Valves; Float Valves; Float Switches.

5356

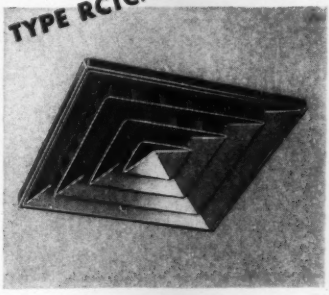
TYPE RC . . . For Standard Installations



TYPE RCDF . . . For Drop Frame Installations



TYPE RCTC. . . .For Tile Ceilings



Announcing New...

AGITAIR® TYPE RC

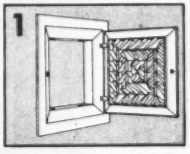
WITH REMOVABLE DIFFUSER CORE

. . . and three distinct styles of mounting frames. Highly efficient in performance, attractive in appearance and designed to meet any and all conditions.

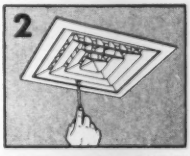
The New AGITAIR diffusers are the result of painstaking research to provide you with square and rectangular air outlets that are practical from every standpoint. The removable core with unlimited air distribution pattern possibilities, and the new mounting frames incorporate many AGITAIR exclusive features and desirable functional qualities.

AGITAIR "RC" diffusers are available in a wide variety of sizes and patterns . . . easy and economical to install. For complete engineering and application data contact your nearest AGITAIR representative or write direct to Air Devices Inc.

1-2 YOU'RE THRU...



Insert diffuser "slide hinges" into frame slots



Turn mounting lock 90° with screw driver

WRITE FOR COMPLETE INFORMATION

AIR DEVICES INC.

17 EAST 42nd STREET • NEW YORK 17, N. Y.

AIR DIFFUSERS • AIR AND GREASE FILTERS • EXHAUSTERS

THE 525 WILLIAM PENN PLACE BUILDING, Pittsburgh, Pa. A John W. Galbreath & Co. enterprise, has 41 stories of ultra modern office space.

Associated Architects
Harrison & Abramovitz . . . New York
William York Cocken . . . Pittsburgh

General Contractor
Turner Construction Company

Mechanical Engineers
Meyer, Strong & Jones

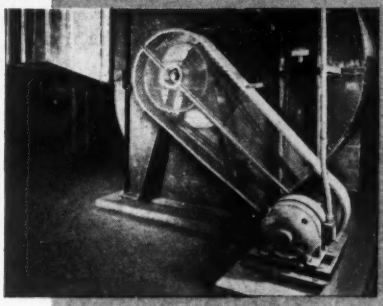
Heating, Ventilating & Air Conditioning Contractors
Dravo Corporation

Featuring the most modern equipment, including...

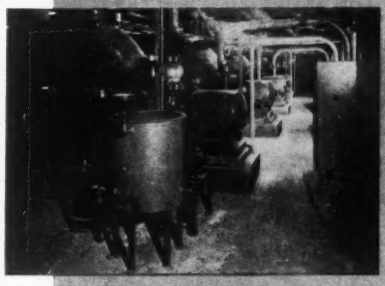
95 ELLIOTT CROCKER-WHEELER MOTORS

A modern "two-zone" air conditioning system assures uniform comfort level in this first completely air conditioned large office building in Pittsburgh, Pa. Throughout the system, Elliott Crocker-Wheeler Protected-Type motors assure minimum maintenance and maximum dependability on vital ventilating fan and pump drives. These versatile motors are the choice for service like this because of their sound design and construction which assure reliable performance and protection against moisture, oil, grit and dust.

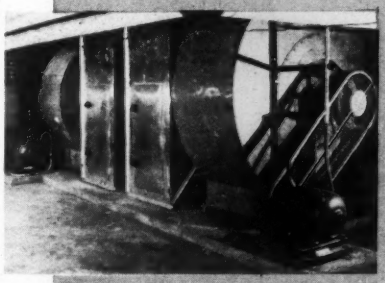
Make it Elliott Crocker-Wheeler motors on your next job. You can't specify better motors for air conditioning systems.



A 15-hp Elliott Crocker-Wheeler motor driving a 39,500 cfm return fan.



Three Elliott Crocker-Wheeler 125-hp motors driving pumps rated at 2275 gpm in the refrigeration system.



Exhaust fans, driven by Elliott Crocker-Wheeler motors, on 15th floor. Foreground: 20,320 cfm fan, 10-hp motor. In rear: 15,000 cfm fan, 7½-hp motor.

ELLIOTT Company

CROCKER-WHEELER DIVISION • AMPERE, N. J.

For large motors: RIDGWAY DIV., RIDGWAY, PA.

Plants at: JEANNETTE, PA. • RIDGWAY, PA. • AMPERE, N. J.
SPRINGFIELD, O. • NEWARK, N. J.

W2-15

BRANCH OFFICES AND REPRESENTATIVES IN PRINCIPAL CITIES
ELLIOTT APPROVED SERVICE SHOPS COVER THE COUNTRY

Whenever Your Plans Call For

Bayley "Packaged" Ventilation . . .

Size 300 Type F Belt Driven Vent Set With Drive Cover.

This New Bayley Selector Guide Saves Time and Money!

BAYLEY has reserved for you a copy of a completely new and different style of Blower Data Sheet . . . It's laid out to help you quickly and accurately specify "packaged" blower sets for your ventilating and conditioning system requirements. Designed by experienced air handling engineers, this condensed guide saves you hours of hunting for equipment with the right characteristics to apply to your job. You incur no obligation in writing for the copy we have "earmarked" for you. Mail the Coupon TODAY!

Bayley

Engineered Air Handling Equipment

Bayley Blower Company
6600 W. Burnham St.
Milwaukee 14, Wis.

Without obligation, please send copy of the new Bayley Blower Data Sheet.

FIRM .....

Name & Title .....

Address .....

City ..... Zone ..... State .....

BAYLEY BLOWER COMPANY

6600 W. BURNHAM ST. — MILWAUKEE 14, WIS.

ALOYCO valves cut installation and maintenance costs

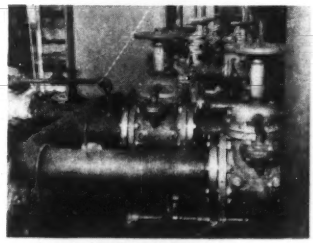
THE CORROSIVE: Ammonium nitrate solution.

THE APPLICATION: Manufacture of prilled ammonium nitrate fertilizer.

THE PLACE: Spencer Chemical Company, Pittsburg, Kansas.

THE VALVES: Sixty-four ALOYCO No. 1105 stainless steel steam jacketed gate valves.

THE RESULTS: Former valves were unsatisfactory due to hot spots caused by improper insulation and high maintenance costs. Replacement with ALOYCO valves has cut the cost of expensive fabrication of steam tracing which is not satisfactory for efficient operation. Performance of ALOYCO valves has been extremely good, with no evidence of freezing, corrosion or leaks.



ALOYCO jacketed gate valves were selected for this new process to meet both cost and performance requirements.

THE BACKGROUND: ALOYCO's entire manufacturing and engineering services are devoted to the production of corrosion-resistant alloys.

All our facilities are directed toward reducing valve costs, lengthening valve life in corrosive services. It is no wonder more ALOYCO corrosion-resistant valves are used than any other brand.

Whenever your manufacturing or processing problem can be solved by a corrosion-resistant valve, let our *Aloyco Department of Corrosion Analysis* work with you.

ALLOY STEEL PRODUCTS CO., INC.
1322 West Elizabeth Avenue, Linden, N. J.

Longer Lasting
ALOYCO VALVES
1st in Corrosive Service

Lasts longer in corrosive service

ALOYCO sampling valves are functionally designed for convenience and dependability. Like all ALOYCO valves, these specialized valves are the result of extensive metallurgical research and engineering and the production of high alloy valves exclusively.

ALOYCO No. 733 Sampling Valve has an ingenious expansion chamber which enables samples to be taken without splattering.

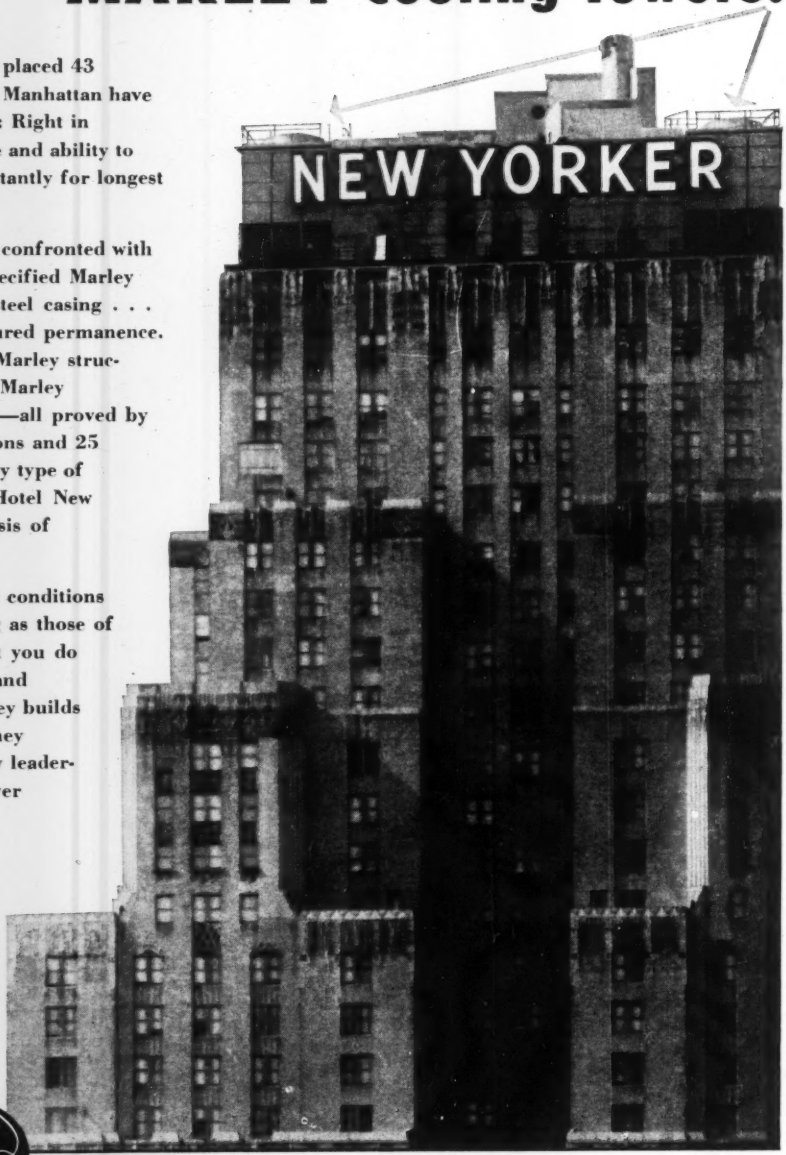
Planning for Permanence, Hotel New Yorker installs

MARLEY Cooling Towers!

Water Cooling Towers placed 43 stories above mid-town Manhattan have to be right all the way: Right in design, in performance and ability to deliver cold water constantly for longest possible service life.

Hotel New Yorker, confronted with this exact situation, specified Marley towers with stainless steel casing . . . a combination for assured permanence. Marley design ability, Marley structural engineering and Marley mechanical equipment—all proved by thousands of installations and 25 years of service to every type of industry—were what Hotel New Yorker used as the basis of their selection.

Your cooling tower conditions may not be as exacting as those of Hotel New Yorker, but you do want the permanence and performance that Marley builds into every product. They have earned for Marley leadership in the cooling tower industry.

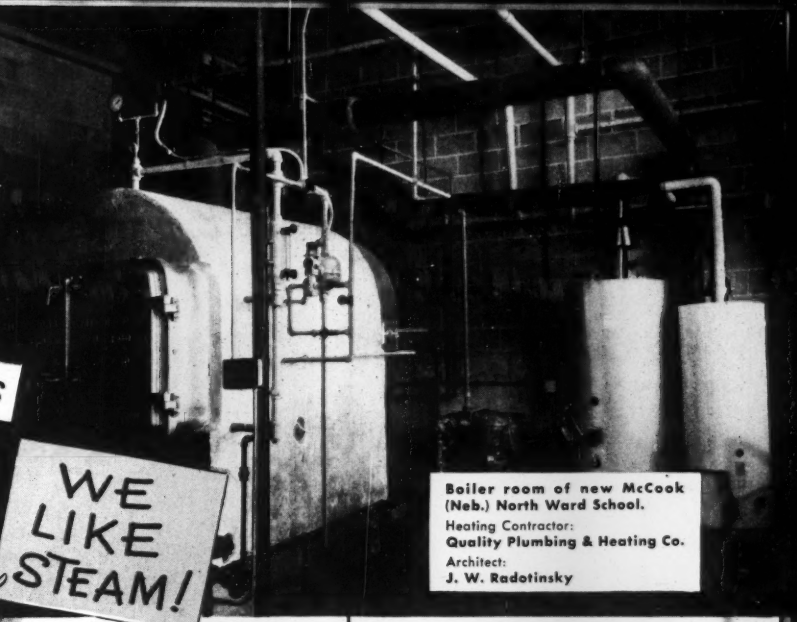


producers of
DOUBLE FLOW TOWERS
DRICOOLERS
AQUATOWERS
NATURAL DRAFT TOWERS
CONVENTIONAL TOWERS
SPRAY NOZZLES
DOUBLE FLOW AQUATOWERS

MARLEY

The Marley Company, Inc.

Kansas City 5, Missouri



Boiler room of new McCook (Neb.) North Ward School.
Heating Contractor:
Quality Plumbing & Heating Co.
Architect:
J. W. Radotinsky

They're on the March for Steam!

Like the folks at party caucuses, heating engineers have been known to have some sharp differences of opinion . . . but there are still plenty of experienced men casting their votes for steam.

Particularly in schools and institutions that old campaigner, steam, is going strong. One of the many examples of this is the plant in the recently constructed North Ward School at McCook, Nebraska. The gas-fired DM-61 Fitzgibbons boiler which heats this modern school is pictured here. It was installed by Quality Plumbing & Heating Co. The architect is J. W. Radotinsky.

Very much in the picture is the safety provision always found in a well engineered job — the McDonnell Boiler Water Level Control. The control installed here is the McDonnell No. 247-2 combined boiler water feeder and low water cut-off. It is the standard No. 47-2, illustrated opposite, without Quick-Hook-Up fittings. Instead of being installed in the gauge glass tappings, one-inch equalizing pipe is used on boilers of this kind which have independent water columns.

Yes, water level control gets an almost unanimous vote for all the new steam jobs, but there are still hundreds of older steam plants that do not have low water protection . . . and need protection even more! Are you going after this profitable business?

McDONNELL & MILLER, INC., 3500 N. Spaulding Ave., Chicago 18, Ill.

Doing One Thing Well

Your Jobber

McDonnell No. 47-2

No hand-fired steam boiler should be without the No. 47 Boiler Feeder — no automatically - fired boiler without the No. 47-2 feeder cut-off combination. Constantly improved year after year, the No. 47 is the last word for boilers up to 5000 sq. ft. capacity; maximum steam pressure, 25 lbs. Other types for larger and higher pressure boilers.

McDonnell No. 67

Next best thing to the No. 47-2 for the automatically - fired boiler is the No. 67 Low Water Fuel Cut-off. It is for boilers of any size, maximum pressure, 20 lbs.

McDonnell No. 150

For those higher pressure boilers (maximum, 150 lbs.) the No. 150 is the answer. It controls the feed pump directly from the boiler water level; also provides low water fuel cut-off and low water alarm when desired. Same control made with integral water column for easy installation — the No. 157.

McDONNELL

ater Level Controls

WHAT *Life-Lines* REALLY DELIVER IS MORE SERVICE...LESS SERVICING

The way to grease modern motors is DON'T!

The modern, *pre-lubricated* Life-Line consigned greased fittings to the motor museum almost ten years ago—and did away with faulty lubrication.

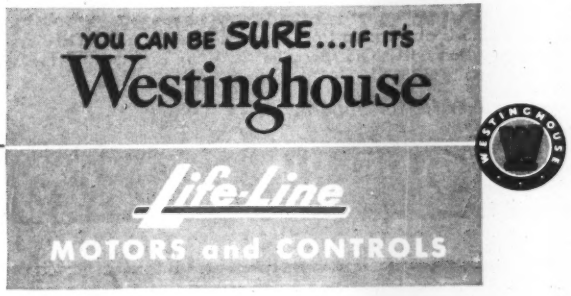
Think what it means. No more incorrectly greased motors. No failures from overlubrication, from under lubrication . . . from use of incorrect or dirty grease. Correct lubrication is sealed in . . . in advance.

Result? Longer motor life. Over a half million *pre-lubricated* Life-Line motors operating in every conceivable type of application have proved that outages from incorrect lubrication have been eliminated completely.

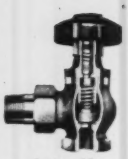
Take the case of an eastern manufacturer, for example. Motors were installed high on a press—out of reach of a maintenance man. Consequently, motor lubrication was forgotten. Bearings failed—windings burned. Then *pre-lubricated* Life-Lines were installed. Failures disappeared. Today, motors are still forgotten—but safely.

Remember, the way to lubricate a modern motor is don't. And, to spot a *truly* pre-lubricated motor, look for a motor that has *no* grease fittings. You'll *know* then it needs no greasing attention. You'll find your answer in Life-Lines.

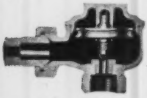
Ask your nearby Westinghouse representative for a copy of "Facts on Pre-lubricated Bearings, B-4378", and for all the reasons why Life-Lines offer you more service on the job . . . less servicing. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21682



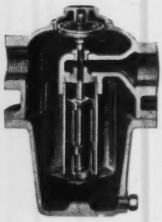
ILLINOIS *Heating System* CONTROLS



Series 48
Radiator Valve



Series G
Radiator Trap



Series G Float and
Thermostatic Trap

Illinois stresses the importance of control . . . not only for comfort and convenience . . . but fuel conservation as well. These control systems are offered in three types and each admits of modifications to meet special conditions. They are:

GENERATION Control . . . Type C

For independent boiler installations affording the maximum in fuel economy. Controls steam generation as well as steam circulation . . . a double economy.

CONTINUOUS FLOW Control . . . Types A and M

In installations which require zoned control, or where steam is used for other than heating and domestic hot water service, or where steam is supplied by Central Station Service, these systems are recommended. Illinois Flow Control Valves of the full floating type give complete and accurate regulation of steam flow. Furnished for pneumatic or manual operation, singly or in combination.

CYCLING FLOW Control . . . Type E

These systems have a wide range of application for automatic or manual control of steam flow and pressures not only in vacuum systems but in one-pipe or two-pipe gravity installations as well.

●

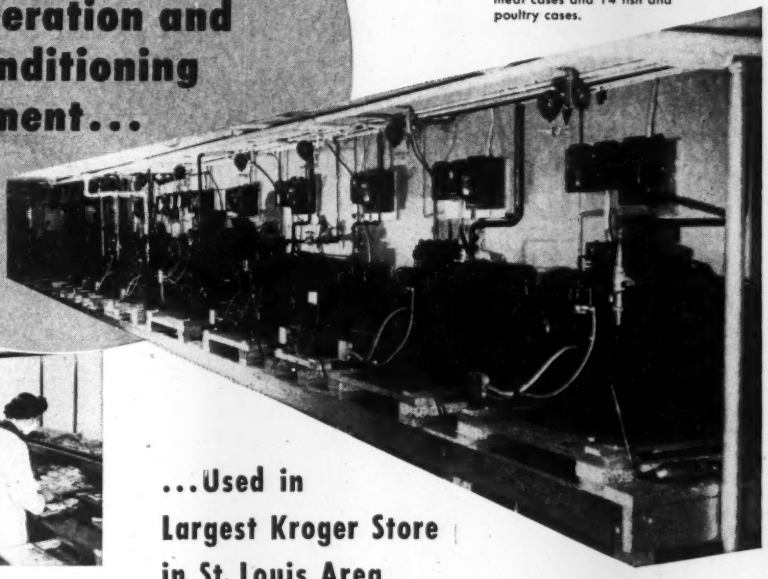
In addition to controls, ILLINOIS is also known from coast to coast for high efficiency standard vacuum and vapor systems. ILLINOIS specialties have the cumulative experience of 50 years built into them.

Write for bulletins

ILLINOIS ENGINEERING COMPANY
INCORPORATED 1900
RACINE AVENUE AT 21ST STREET • CHICAGO 8

Curtis

Refrigeration and Air Conditioning Equipment...



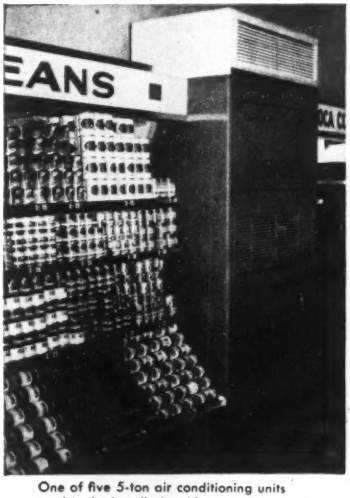
Bank of eleven refrigeration units, ranging from ⅓ to 3 h.p. used to provide refrigeration for 66 feet of self-service meat cases and 14 fish and poultry cases.

Curtis packaged unit controls temperature and humidity in pre-packaging room.

...Used in Largest Kroger Store in St. Louis Area

Kroger's confidence in Curtis equipment is well-founded. Curtis equipment is built by a company with over 98 years of manufacturing experience.

With the broad Curtis line of Air Conditioning and Refrigeration equipment Curtis Distributors can make this type installation.



One of five 5-ton air conditioning units used in the installation. Note small space used by compact cabinet.

Curtis REFRIGERATING MACHINE DIVISION
of Curtis Manufacturing Company
1950 Kienlen Avenue • St. Louis 20, Missouri

Use Coupon for Complete Information

CURTIS REFRIGERATING MACHINE DIVISION
of Curtis Manufacturing Company
1950 Kienlen Avenue • St. Louis 20, Missouri
I am interested in direct factory franchise. Send complete details.

Company Name .....

Street .....

City ..... *Zone* ..... *State* .....

716 *Signed* .....

How Honeywell Customized Temperature Control Helps Bell and Howell Meet Wide Range of Temperature Needs

Specially designed system provides precision industrial control, finest comfort—and saves fuel

These dramatic photographs of Bell and Howell's Chicago plant demonstrate the kind of operation that has made the company one of the world's leading manufacturers of motion picture projectors, cameras and microfilm equipment.

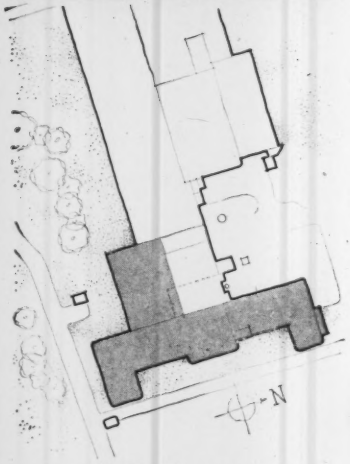
And they serve, too, to demonstrate the great flexibility of Honeywell Customized Temperature Control.

At Bell and Howell, this specially designed system provides factory personnel, office workers and executives with the finest kind of comfort.

But there's more to the story.

Many phases of an operation that produces such precision equipment as cameras, projectors and film demand extremely precise temperatures. These, too, are provided by Honeywell Customized Temperature Control.

And it's this customized control system that enables Bell and Howell to save a great deal on fuel bills each year—by setting back the temperature at night in big factory areas.



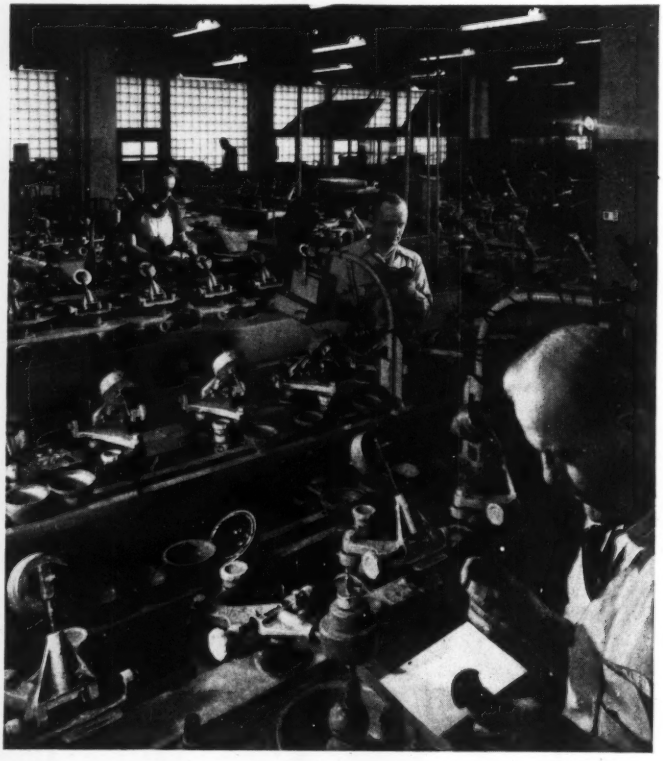
Over a half million square feet of factory, office

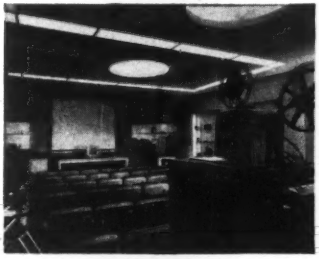
The shaded area on the floor plan indicates the air conditioned sections of the plant. Located here are offices, some shipping and stores, some manufacturing. The unshaded portion is mainly manufacturing, partly shipping and storage area.

Architectural firms that designed the main plant were Mundie, Jensen, Bourke and Havens, Chicago, and Bruce A. Gordon and Company, Chicago. Mechanical engineering was by Samuel R. Lewis and Associates, Chicago. Honeywell Customized Temperature Control was installed by L. H. Prentice Co., Chicago. Victor Charn of the Chicago firm, Ragnar Benson Inc., was the architect for the new factory area. Here mechanical engineering was done by Nelson and Nettnin, Inc., Chicago. Honeywell Customized Temperature Control here was installed by O. A. Wendt Co., Chicago.

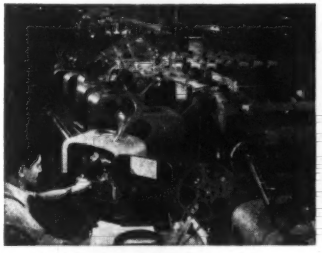
Lens room temperature an exact 77 degrees

To make sure the pitch used in polishing precision optics retains the proper consistency, Honeywell Customized Temperature Control keeps the temperature exactly 77 degrees in the lens polishing room, right. And in Bell and Howell's film plant in Rochester, N. Y., customized temperature control guards another vital manufacturing process. There, a variety of temperatures—all different—are held at the critical level with a tolerance of only one-half of one degree Centigrade.

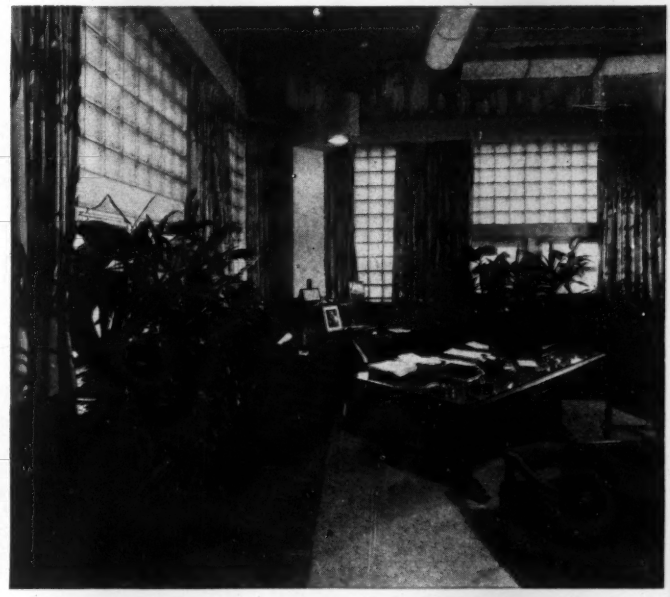




In the company's projection salon as many as 50 persons can meet to view business and training films. Smoking is permitted, yet the air is never clouded. Honeywell Customized Temperature Control takes care of that—removing stale air and replenishing it with fresh air for complete comfort.



The final test line for Bell and Howell's famous 16 mm. Filmosound projector is shown above. It is in this area that Honeywell Customized Temperature Control makes possible great fuel savings. For here a master thermostat can be turned down at night to lower temperatures when the area is not in use.



Executive offices like this are perfectly comfortable—no matter how changeable the weather outside. Because in the office area Honeywell Customized Control provides an *individual* thermostat for every room. This thermostat can be adjusted by room occupants to give them the exact temperatures they want. And the ultimate in comfort such a system guarantees is shared by all who work in this part of the plant—secretaries, typists, restaurant personnel and executives. This raises efficiency and helps make Bell and Howell a pleasant, comfortable place to work—in August as well as in January.

For Comfortable, Even Warmth in New or Existing Public Buildings, Specify Honeywell Customized Temperature Control

Whether it's a factory, store, office, school, garage—or any size public building—new or existing—there's a Honeywell Customized Temperature Control System to meet your clients' heating and ventilating problems.

Once equipped with a Honeywell Customized Temperature Control System, they'll have the right kind of controls to keep their employees, customers and tenants comfortable—and they'll save fuel besides.

For full facts on Honeywell Customized Temperature Control, call your local Honeywell office. There are 91 across the nation. Or mail the coupon today.

"I'll bet no other factory has better control over its heating and air conditioning," says Bell & Howell Superintendent of Maintenance Branson "Buck" Weaver.

"This Honeywell Customized Temperature Control keeps *everyone* comfortable. And it keeps *me* happy because it requires almost no maintenance. Besides that, I enjoy reporting the latest fuel-saving figures."

MINNEAPOLIS-HONEYWELL
Dept. HA-971, Minneapolis 8, Minnesota

Gentlemen: I'm interested in learning more about your Customized Temperature Control Systems for public buildings.

Name_____

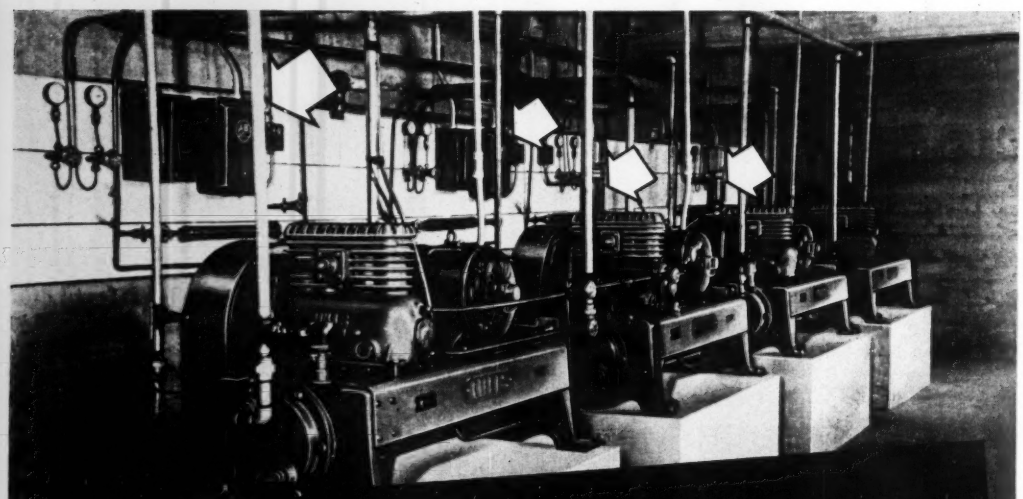
Firm Name_____

Address_____

City_____ Zone____ State_____

MINNEAPOLIS
Honeywell

First in Controls



Mills Compressor Units equipped with Allen-Bradley Bulletin 709 Automatic Starters.

MILLS COMPRESSOR UNITS equipped with ALLEN-BRADLEY TROUBLE FREE MOTOR CONTROLS

A-B Quality

Why are Allen-Bradley starters so popular for refrigeration and air conditioning service? . . . because they are trouble free. Only ONE moving part. No pivots, pins, or bearings to corrode or stick . . . no jumpers to break. You install them . . . and forget them!

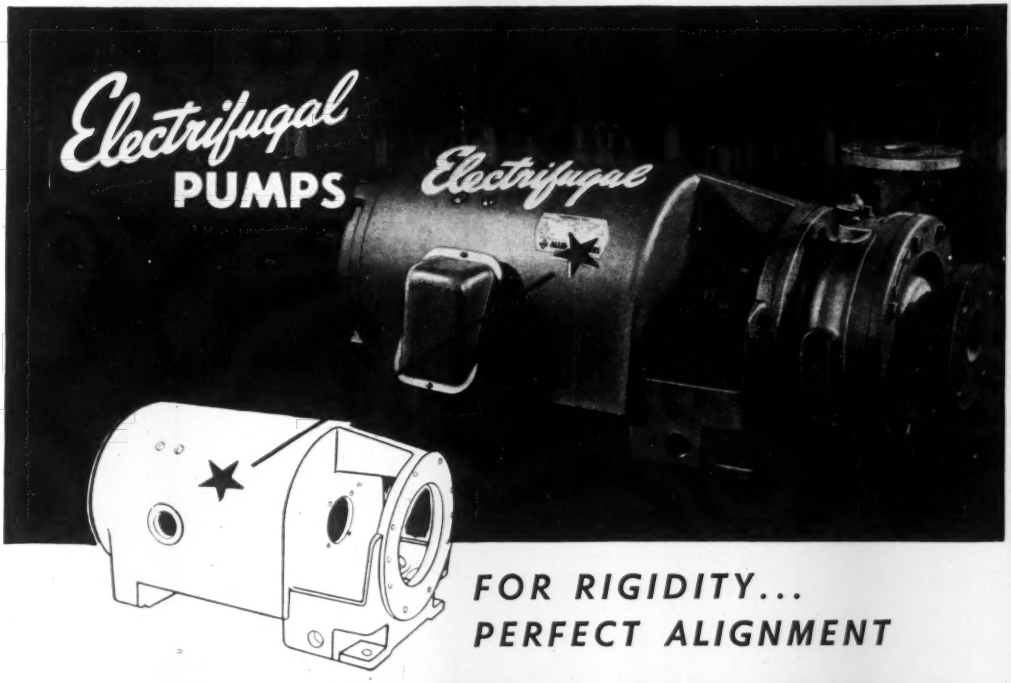
No contact maintenance . . . Allen-Bradley silver alloy contacts never need cleaning, filing, or dressing.

Dependable overload relays . . . Allen-Bradley thermal relays are accurate and always dependable . . . even after long service.

Allen-Bradley Co., 1335 S. First St., Milwaukee 4, Wis.

Write for this NEW Allen-Bradley Air Conditioning and Refrigeration Bulletin

ALLEN-BRADLEY SOLENOID MOTOR CONTROLS



FOR RIGIDITY...
PERFECT ALIGNMENT

Buy the Pump Unit with the 1-PIECE FRAME!

- **No alignment problems.**
- **No extra parts to buy.**
- **Less space required than for ordinary base mounted units.**

FRAME IS OF RIGID cast iron construction with no joints from motor end housing to pump casing.

On the other hand, close-coupled doesn't mean "cramped." There's plenty of space between pump and motor for packing maintenance or replacement.

In addition, wearing rings and shaft sleeves protect casing and shaft from wear and are easily replaced at low cost when worn. As a result you will find maintenance costs very low.

Talk over your pump selection problems with your Allis-Chalmers authorized distributor or district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 52B6140. A-3810

Electrifugal is an Allis-Chalmers trademark.

ALLIS-CHALMERS

NEW PUMP FILMS

See new series of 3 sound-slide films, widely praised by educational and industrial groups. Get practical, instructive information on theory, application, installation and maintenance of centrifugal pumps. Series is designed for showing to maintenance meetings, plant groups, and engineering societies. Arrange now for a showing! Call your nearby Allis-Chalmers authorized distributor or district office. Or write Allis-Chalmers, Milwaukee 1, Wis.

Look for Economy
WHEN YOU BUY HEATING PUMPS

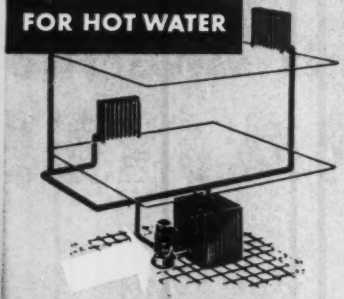
WHEELER-ECONOMY HEATING PUMPS
with Better-Than-Ever Engineering and Quality Control

With the consolidation of Economy Pumps, Inc. and C. H. Wheeler Manufacturing Company, the heating pumps you have always bought as "the best in the field" will now be sold as WHEELER-ECONOMY HEATING PUMPS. Representatives are being appointed in key areas to give you good service with a time-honored line of heating pumps that is now *better than ever.*

The Wheeler-Economy line of heating pumps has undergone a complete engineering check-up and reanalysis from the castings out. Many refinements have been made and a new face-lifting has been effected . . .

TYPES FOR EVERY BASIC HEATING PROBLEM

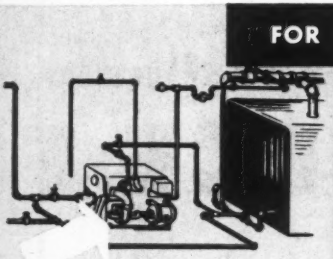
FOR HOT WATER



HOT WATER CIRCULATION

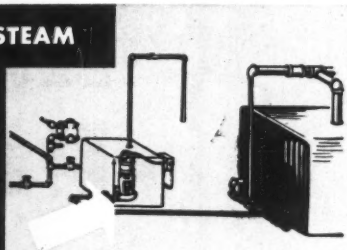
Wheeler-Economy Circulating Pumps deliver hot water to radiators quickly and return warm water to boiler with high efficiency.

FOR STEAM



STEAM VACUUM

The Wheeler-Economy Vacuum Pumps employ the most efficient design ever devised for removing air and water from condensate return lines.



RETURN CONDENSATION

Wheeler-Economy Condensation Pumps give outstanding performance in a compact dependable design.

WHEELER-ECONOMY HOT WATER CIRCULATING PUMPS

Type SCV—Vertical direct connected centrifugal pump. Sizes 1" to 3". Capacities to 500 GPM. Various RPM speeds 1150 to 3450. Heads to 225'.

Type SCC—Close coupled vertical or horizontal mounted. Sizes 1½" and 2". Capacities to 100 GPM. 3450 RPM. Heads to 120'.

TYPE SCV

TYPE SCC

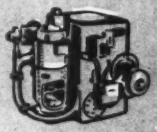
WHEELER-ECONOMY VACUUM PUMPS

Type VV—Vertical Vacuum Pumps—Suitable for use on all ordinary jobs operating between 3 and 12 inches of vacuum. Made for all discharge pressures up to 150 lb. per sq.in. Capacity sq.ft. E.D.R. 2500 to 15,000. Single and duplex units.

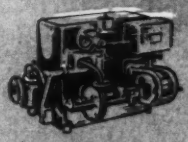
Special Capacities—VVS and VVSD single and duplex units recommended wherever capacity of system or air leakage is greater than ordinary. Also where lifts or pockets in the returns necessitate carrying higher vacuum. (Example: 10 to 16 inches.)

Type SVA—Horizontal Vacuum Pumps—For ordinary jobs operating between 3 and 12 inches of vacuum. Discharge pressures up to 150 lb. per sq.in. Capacity sq.ft. E.D.R. 20,000 to 100,000. Single and duplex units.

Special Capacities—Styles SVS single unit and DVS Duplex Unit, recommended where air capacity or air leakage in the system is greater than ordinary. Also where lifts or pockets in return require the carrying of higher vacuum—example 10 to 16 inches.



TYPE VV



TYPE SVA

WHEELER-ECONOMY RETURN CONDENSATION PUMPS

Type E—Operate at 1750 RPM or for 50 cycle current at 1440 RPM. The best pump where extremely quiet operation is desired. Single and duplex units. Capacity sq.ft. direct C.I. radiation or equivalent: 1000 to 65,000.

Type EC—Available for the same or higher pressure than handled by Type E pumps. Operate at 3450 RPM. Units for 50 cycle current operate at 2880 RPM. Capacity sq.ft. direct C.I. radiation or equivalent 1000 to 65,000. Single and duplex units.

Vertical Underground Pump—Used where returns are below floor level or otherwise too low for horizontal pumps. Cast Iron tank can be installed flush with floor. No pit required for pump. Low and medium pressure units equipped with single stage pumps of vertical design. For higher pressure units a multistage pump of special design is used. Capacity in sq.ft. direct C.I. radiation or equivalent 2000 to 50,000. Single and duplex units.

Type S—Condensation Pump with Steel Receiver—An "Economy" installation where service is not severe and heavy construction cast iron tanks are not required. Where steel receiver is satisfactory and low cost is of primary importance Type S is recommended. However, these low cost models are the equal of the top grade in many competitive lines. Single or duplex units.

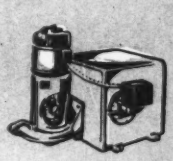
Type MR—Lightweight Pump for low pressure steam heating systems. Priced to meet competition . . . with no compromise in workmanship and materials. Capacities up to 65,000 sq.ft. E.D.R. Single and Duplex Units.

Types B and C—Horizontal Return Condensation Pumps—Type B multi-stage pump for pressures up to 150 lbs. 1750 RPM. Quiet operation. Capacities in sq.ft. direct C.I. radiation equivalent to 6000 to 65,000.

Type C multi-stage pump for pressures up to 175 lbs. 3600 RPM 60 cycle. Identical to type B except for higher speed operation. Capacities in sq.ft. direct C.I. radiation equivalent to 6000 to 65,000.

Type G—Horizontal Return Condensation Pump—Type G single suction, single stage designed for medium and high pressures at motor speeds 1800 to 3450 RPM. Receivers of all three types, "B", "C" and "G" are welded steel plate unless otherwise ordered.

All Wheeler-Economy Heating Pumps are tested before shipment and guaranteed for workmanship and materials.

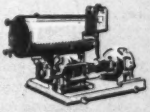


TYPES E & EC

TYPE U

TYPE S

TYPE MR



TYPES B & C

TYPE G

SOME TERRITORIES STILL AVAILABLE FOR REPRESENTATIVES WHO QUALIFY

Over 15 million dollars' worth of these pumps are in use throughout the United States

126

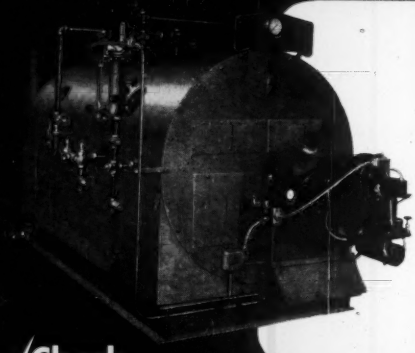
WHEELER-ECONOMY PUMPS

ECONOMY PUMPS, INC. · DIVISION OF C. H. WHEELER MANUFACTURING CO.
19TH AND LEHIGH PHILADELPHIA 32 PA

SAVE FUEL-SAVE LABOR-

Choose Dutton!

TWO LINES TO SUIT YOUR NEEDS... BOTH FAMOUS FOR EFFICIENCY... LONG LIFE... LOW OPERATING COST



EconoTHERM...

the compact, automatic "packaged" boiler with exclusive Off-Center Firing

Compare it point-by-point — and you'll see *why* the EconoTHERM's advanced engineering *pays off* in fuel and labor saved! Off-Center Firing results in faster steaming and greater safety with guaranteed 80% efficiency. Completely automatic . . . amazingly compact . . . 5 or more square feet of heating surface per H.P. Gas or oil fired — to 250 H.P. Write for EconoTHERM Bulletin EC-100B.

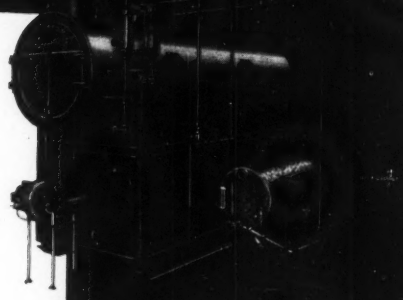
Check First with Dutton

OTHER TYPES AND SIZES 5 H.P. AND UP.

EconoMIST...

gives you 5-way firing convertibility... plus reliable H. R. T. design

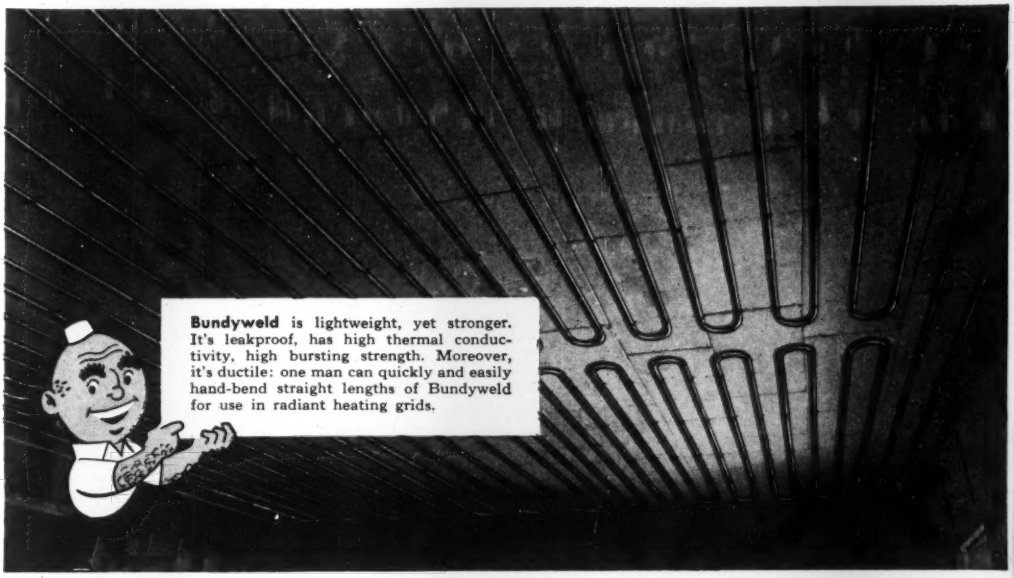
Install it for gas, light oil, heavy oil, stoker, or hand firing — you can later convert the EconoMIST to *any* one of these firing methods. Highly adaptable, it's above all tremendously *dependable*. Of all "packaged" units, EconoMIST sets the standards for operating simplicity and low maintenance costs. Sizes from 15 to 105 H.P. Write for EconoMIST Bulletin EC-100G.



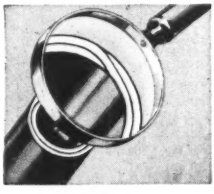
Handy Steam Cost Calculator mailed FREE on request... or ask your Dutton representative. (See Yellow Pages in Phone Book.)

Dutton BOILERS

DIVISION
HAPMAN-DUTTON COMPANY
KALAMAZOO, MICHIGAN • BOILER BUILDERS SINCE 1880


Bundyweld is lightweight, yet stronger. It's leakproof, has high thermal conductivity, high bursting strength. Moreover, it's ductile: one man can quickly and easily hand-bend straight lengths of Bundyweld for use in radiant heating grids.

Get the edge on your local competition— with Bundyweld Ceiling Radiant Heating



Key to Low Cost

Bundyweld is the only tubing double-walled from a single strip. It's steel, copper-coated inside and out. It gives finest radiant heating performance, with savings up to 50% on material costs and installation time.

Standard 20′ or 24′ lengths of Bundyweld are easily formed into coils in shop or on job site. Expanded ends (furnished when specified) are quickly soldered into leakproof union. Joined, lightweight coils are easily mounted onto ceiling, quickly plastered over.

Think of telling a prospect for a new heating job that his house can be free of sooty registers and radiators, free of heating drafts, free of the annoyance of streaked walls and ceilings.

Sound selling points? You bet they are, yet that's only the beginning: houses with Bundyweld Ceiling Radiant Heating offer air that's clean and fresh as spring, lower operating costs, and reduced housekeeping chores as well.

Beginning only recently, Bundy ads in *Better Homes & Gardens* and *American Home* have featured a coupon offering a free "Home Owner's Guide to Bundyweld Ceiling Radiant Heating." Since the offer began, almost 20,000 have been sent out to prospective home buyers! These people want to know more about today's most advanced, practical heating method; they want to know the names of builders and plumbing and heating contractors using it.

Put your business squarely in the path of this quickly growing interest. Put your business ahead of all competition in your area. Send the coupon below for details on Bundyweld Ceiling Radiant Heating and Bundyweld Tubing!

Bundyweld
Ceiling Radiant Heating

Radiant Heating Division
BUNDY TUBING COMPANY
Detroit 14, Michigan

Radiant Heating Division, Dept. HP-952
Bundy Tubing Company, Detroit 14, Michigan

☐ Send free 20-page nontechnical brochure explaining Bundyweld Ceiling Radiant Heating.
☐ Send Bundy technical radiant heating pamphlet.

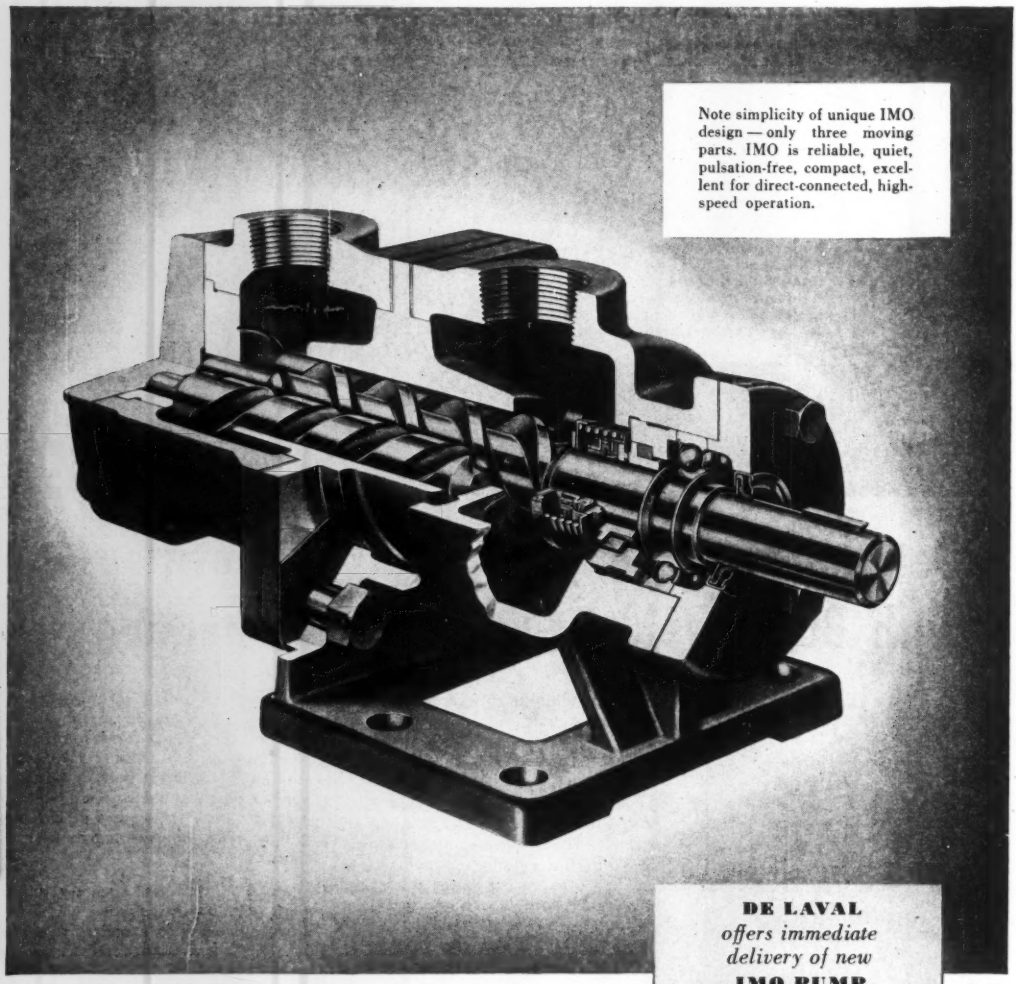
Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

Newest IMO pump – Greatest savings



Note simplicity of unique IMO design — only three moving parts. IMO is reliable, quiet, pulsation-free, compact, excellent for direct-connected, high-speed operation.

DE LAVAL
offers immediate delivery of new
IMO PUMP
Write today

DL 147

This newest De Laval IMO pump — Model A313B — can be used profitably on a wide variety of hydraulic applications for higher pressures. Quantity-produced to help trim your costs, the new IMO saves you up to 40% in initial cost over other IMO models for pressures up to 275 psi. In addition, this quality-designed rotary positive displacement pump gives you all the low-maintenance advantages of the famous IMO pumping principle.

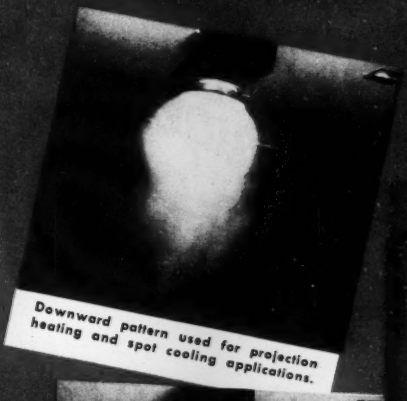
Put the new De Laval IMO A313B pump to work handling light or viscous fluids in hydraulic systems, rotary and steam atomizing oil burners, lubrication, governing systems and similar services. Specify it for capacities to 80 gpm, pressures to 275 psi and intermittent pressures to 325 psi.

DE LAVAL *IMO Pumps*

DE LAVAL STEAM TURBINE COMPANY
Trenton 2, New Jersey

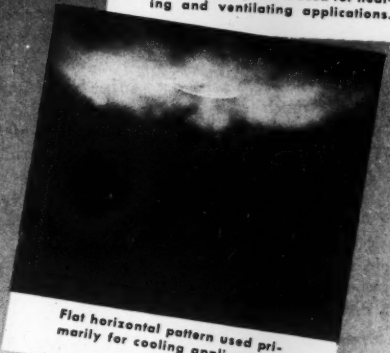
Anemostat Type C-1
ADJUSTABLE *Air Diffuser*

Just "Turna-kone" for the air pattern you want!



Downward pattern used for projection heating and spot cooling applications.

Intermediate pattern used for heating and ventilating applications.



Flat horizontal pattern used primarily for cooling applications.

Anemostat's Type C-1 air diffuser is *easy to adjust*— simply "Turna-kone" to vary the air pattern from horizontal to vertical discharge. No tools, no screws, no fussing, no fiddling. Changing pattern does not affect balance of system.

The Type C-1 Anemostat air diffuser is *easy to install* on exposed duct or flush to ceiling. The snap-in assembly cuts installation time two-thirds. It has clean, handsome, concentric lines that add to ceiling beauty, blend into your design motifs. It provides true *draftless air diffusion*, eliminates stale air pockets, equalizes temperature and humidity.

ANEMOSTAT®

DRAFTLESS *Aspirating* AIR DIFFUSERS

ANEMOSTAT CORPORATION OF AMERICA

10 EAST 39th STREET, NEW YORK 16, N. Y.

REPRESENTATIVES IN PRINCIPAL CITIES

SELECTION MANUAL 40

gives full story on new Anemostat Type C-1, the *ultimate in adjustable air diffusers.*

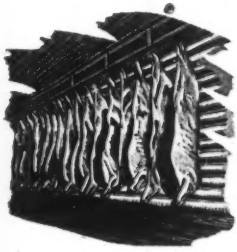
Send for your copy.

"No Air Conditioning System Is Better Than Its Air Distribution"

AC-1290

UNSURPASSED

in the Refrigeration Industry



W-S FORGED STEEL FITTINGS

Screw-End and Socket-Weld Types

Since Watson-Stillman engineers first developed their special line of forged steel fittings to meet the service conditions of the Refrigeration Industry, the W-S double-diamond trade-marked fitting has been identified with longer, more dependable life and lowest per-year cost in all phases of the industry's operations.

Precision-machined from solid drop-forged steel bodies, Watson-Stillman fittings are much less subject to unscheduled outages than fittings made from other materials or by other methods of fabrication. Being stronger, they are much smaller and lighter . . . bringing economies in weight and space all the way down the line. Their denser, tougher metallic structure is more resistant to corrosion, vibration, shock, and all types of stresses—including internal pressure and creep—than other types.

Yes, there are many reasons why W-S double-diamond fittings are preferred by *all* industries. Want more information? See your Watson-Stillman distributor or write direct.

• **Stronger** • **Smaller** • **Lighter** • **Tighter**
• **More Uniform** • **Lower *Service* Cost**

SOLD THROUGH LEADING DISTRIBUTORS . . . EVERYWHERE

9-M-4

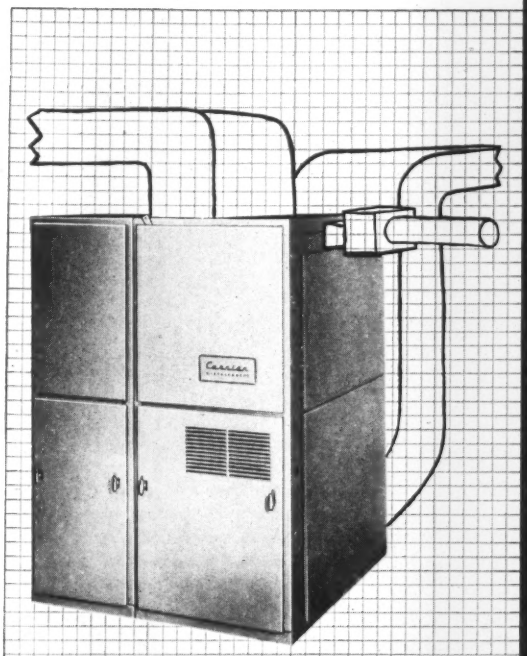
WATSON-STILLMAN
ESTABLISHED 1848

DISTRIBUTOR PRODUCTS DIVISION
ROSELLE, NEW JERSEY

Designers and Manufacturers of Forged Steel Fittings, Hand Pumps, Jacks, Wire Rope Shears, Pipe Benders and Hydraulic Equipment

This belongs in your plans

It's the new Carrier Weathermaker* Air Conditioner . . . the heart of the Carrier Weathermaker Home. We're putting it in the plans of home buyers and architects . . . it belongs in *your* plans, too.



The Carrier Weathermaker is designed for a duct system like that used for forced warm air heating. It burns gas for heating . . . uses a sealed electric refrigerating unit for cooling. It is only a little larger than an ordinary furnace.

It belongs in your plans because

there's a tremendous market waiting for it. Air conditioning is moving fast into the residential field. Home buyers everywhere are real prospects for a simple, compact unit that will heat and cool, give them year-round comfort. These prospects *work* in air conditioned offices and plants, *shop* in air conditioned stores . . . today they want to *live* in air conditioned homes.

It belongs in your plans because

the new Carrier Weathermaker is the only unit that completely fills the bill. At a flick of its switch it heats in the winter, cools in the summer, circulates clean fresh air all year round. It's a single handsome package that fits almost anywhere — in the attic, in the basement, in a utility room, even in a closet.

It belongs in your plans because

it's being pushed—hard—with a campaign that's designed to move the Weathermaker — and the dealers who sell it — right out of the same class with competition. All over the country people are hearing about the *Weathermaker Home* . . . a better-designed, less-expensive home . . . a cleaner, quieter, more comfortable home . . . a home they can have *only* with the Carrier Weathermaker Air Conditioner *you* sell!

Why not write *today* for the full profit story?

* Reg. U. S. Pat. Off.

Carrier

AIR CONDITIONING • REFRIGERATION

For 50 years—the people who know air conditioning best

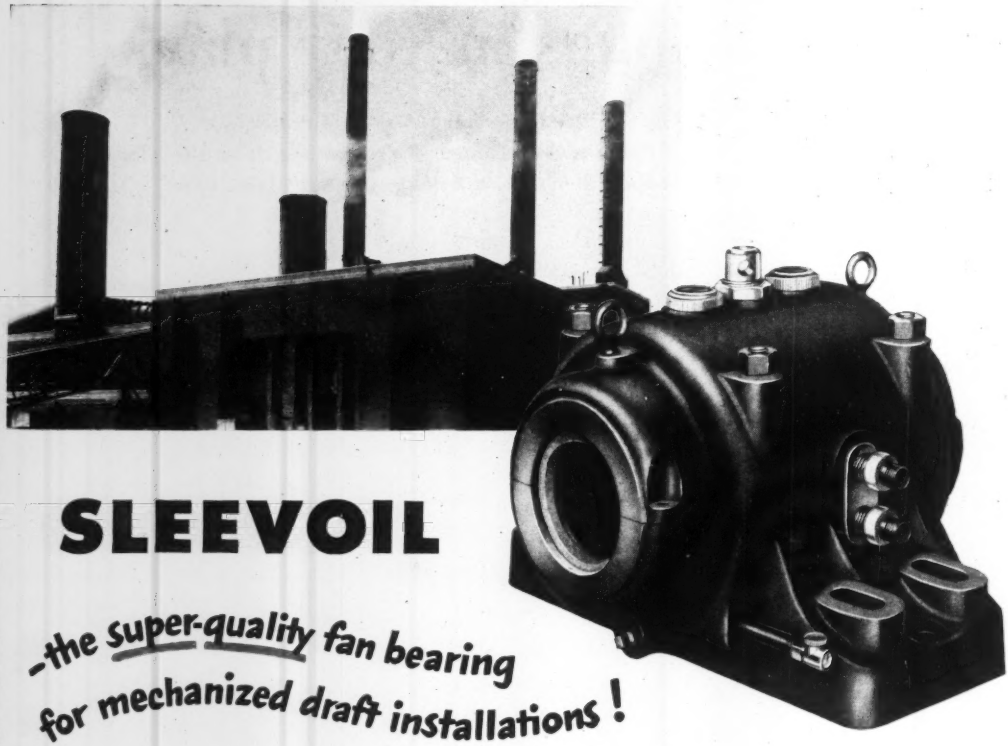
CARRIER CORPORATION
309 S. Geddes Street, Syracuse, New York

Please send me the profit story on the Weathermaker Air Conditioner and the Weathermaker Home.

*Name*_____

*Street*_____

*City*_____ *State*_____



SLEEVOIL

-the super-quality fan bearing for mechanized draft installations!

● Hundreds of generating plants in America run on Dodge Sleevoil Bearings. These famous bearings combine quietness, long life and dependability to a degree unique in the bearing field. They offer engineers of costly power plants a priceless safeguard for their equipment.

Sleevoil Bearings are a Dodge development—created especially to meet the exacting requirements of fan and blower service. They are ideal bearings for important installations calling for induced or forced draft. Designed in cooperation with engineers of leading fan and blower manufacturers, they have a long record of dependable performance in critical service.

Dodge Sleevoil Pillow Blocks are normally available from stock—in both plain and water-cooled types, in shaft sizes from 1-7/16" to 8". Write us for information.

DODGE MANUFACTURING CORPORATION
1600 Union Street, Mishawaka, Indiana

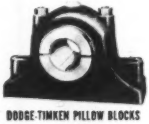
DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on *modern* power transmission machinery for *modern* installations. Look for his name under "Power Transmission Equipment" in your local classified phone book.

FIRST IN POWER TRANSMISSION MACHINERY!

SEALED-LIFE V-BELTS; TAPER-LOCK SHEAVES

TORQUE-ARM SPEED REDUCERS



DODGE-TIMKEN PILLOW BLOCKS

ROLLING GRIP AND DIAMOND D CLUTCHES

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, CHICAGO THRIFT-ETCHING CORPORATION, 1555 SHEFFIELD AVENUE, CHICAGO 22, ILLINOIS

Get more of the FULL RATED PRESSURE with

ZURN engineered

Our 50th Anniversary

LOW PRESSURE DROP STRAINERS

THEY PERMIT HIGH RATES OF FLOW WITH REMARKABLY LOW PRESSURE DROP (LPD) AND IMMEASURABLY IMPROVE THE HANDLING OF FLUIDS (OIL, CHEMICALS, WATER) THROUGH PIPE LINES

WHATEVER IS DONE to compensate for a loss of pressure usually results in an increased cost of handling liquids in pipe lines. But, compensation for the loss of pressure is usually unnecessary when Zurn Engineered Strainers are installed. Instead, a *reduction of pressure loss* is usually obtained. Zurn Low Pressure Drop (LPD) Strainers are design improved for correct circularity; have smooth inner walls combined with correctly sized and perforated baskets which reduce pressure loss and afford maximum protection for all types of mechanical units connected with pipe lines.

Zurn Strainers, are held to close manufacturing tolerances for materials, shape, and dimensions assuring the utmost in strength and safety. Zurn Strainer applications include fluid handling lines for lubricating and fuel oil, and oil during the refining process; a wide range of chemicals produced and used by the various process industries; public utility power plants; power stations; industrial plants; municipal water systems; ships and high temperature, high pressure installations. Zurn Fluid Handling Engineers are available for consultation on your fluid handling problems.

Zurn Sinlex Strainer. Available in offset and straight-through types.
Zurn "Y" Type Strainers available in any cast material and for high pressures.

There is a Zurn Low Pressure Drop Strainer for Every Fluid Handling Purpose.

Write for Pipe Line Strainer Manual No. 951, including previously unpublished pressure drop data.

J. A. ZURN MFG. CO.
INDUSTRIAL DIVISION • ERIE, PA., U. S. A.
***In Canada:* Canadian Zurn Engineering Ltd., Montreal, P. Q.**

Copyright 1952

J. A. ZURN MFG. CO.
Industrial Division; Erie, Pa., U. S. A.
Please send me Pipe Line Strainer Manual No. 951

Name_____

Position_____

Company_____

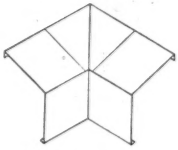
Street_____

City_____ **State**_____

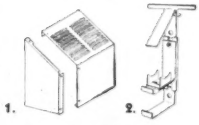
Please attach to your business letterhead—Dept. HPAC

COMMERCIAL
For Schools, Industrial and Commercial buildings.

Accessories for complete, smartly styled installation.



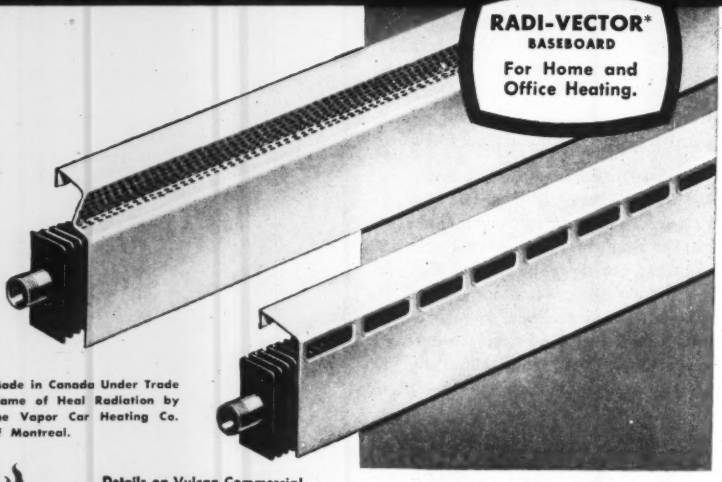
Flexi-corner

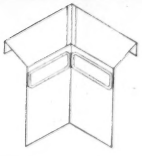


1. Closed End
2. Linovector* Hanger
*Reg. Trade Mark

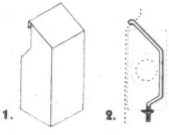
VULCAN

RADI-VECTOR*
BASEBOARD
For Home and Office Heating.





Flexi-corner



1. Closed End
2. Rod Hanger*

Easy to install in any type of construction.

Made in Canada Under Trade Name of Heal Radiation by the Vapor Car Heating Co. of Montreal.

Details on Vulcan Commercial Radiation in catalogs 60 and 125. Step-by-step instructions for Radi-Vector Baseboard Installation in Bulletin 53a.

*Reg. Trade Mark

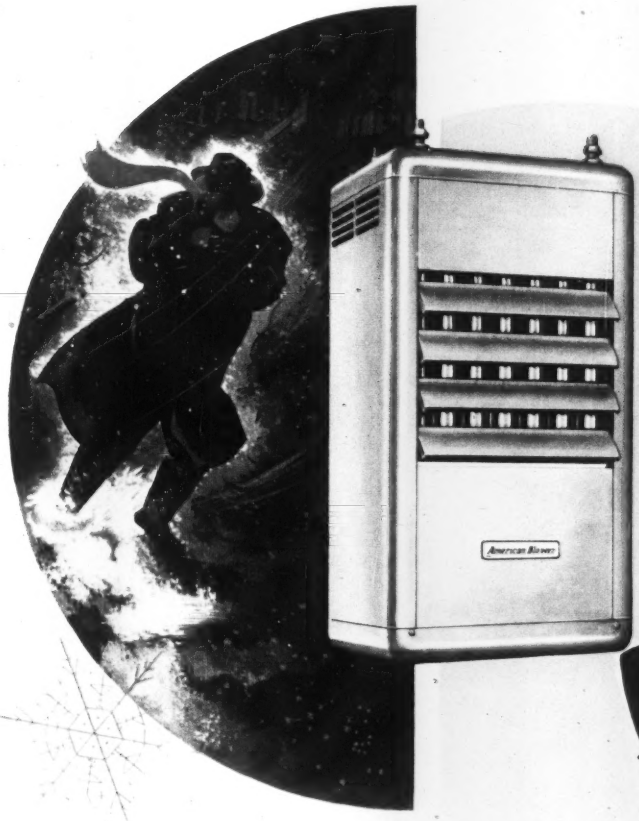
REPRESENTATIVES IN PRINCIPAL CITIES

The **VULCAN** *Radiator Co.*

16 FRANCIS AVE. HARTFORD, CONN.

Over a Quarter Century a Leader (V) *in Fin-tube Radiation*

American Blower – a time-honored name in air handling



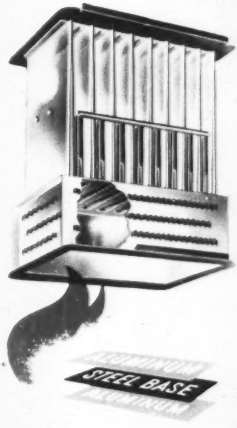
When you install an American Blower Gas-Fired Unit Heater, you will be pleased with its performance. A warm and comfortable atmosphere is assured.

Check these quality features: sturdy steel casing, bonderized against rust; available for manufactured, mixed, natural or LP gases; combustion chamber resists high temperatures and corrosion; quiet, efficient operation; carries Underwriters' Laboratories and A.G.A. approval.

Contact your heating supply house or call the nearest American Blower Branch Office.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of AMERICAN RADIATOR & Standard Sanitary Corporation



American Blower Gas-Fired Unit Heaters. Wide range of sizes. Capacities from 70,000 to 230,000 BTU/hr. input. Write for Bulletin 7117.

AMERICAN BLOWER

YOUR BEST BUY IN AIR HANDLING EQUIPMENT

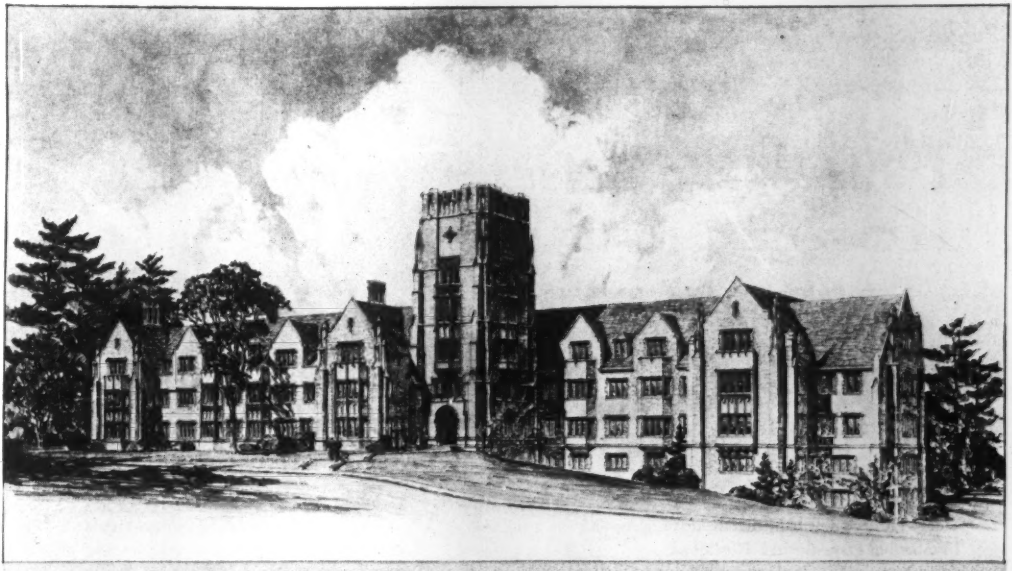
Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • ACME CABINETS • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

IT'S YOUR LIGHT OF LIBERTY KEEP IT BRIGHT

QUALITY YOUNGSTOWN SERVICE

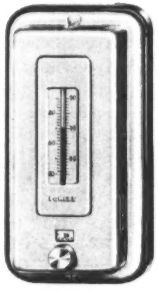
THE YOUNGSTOWN SHEET AND TUBE COMPANY
GENERAL OFFICES - YOUNGSTOWN 1, OHIO
Export Offices - 500 Fifth Avenue, New York City
Manufacturers of
CARBON - ALLOY AND YOLOY STEELS



DUKE UNIVERSITY CLASSROOM and ADMINISTRATION BUILDING, Durham, N. C.

Architects: Office of HORACE TRUMBAUER • WILLIAM O. FRANK • W. EDWARD FRANK, Philadelphia, Pa.

Consulting Engineer: WM. M. WALLACE II, Durham, N. C. • Heating Contractors: DURHAM PLUMBING & HEATING CO.



145 Powers Type D Thermostats used here with single knob limited temperature adjustment. When room is vacated for the day occupant turns dial to word "OFF". Note its simplicity and small size: H. 5⅛", W. 2⅞", Depth 2⅛".

Powers Radiator Control Valve

In Prominent Universities —

POWERS TEMPERATURE CONTROL

is selected to provide the comfort and fuel economy which result from the elimination of overheated rooms.

In Duke University's beautiful new Classroom and Administration building the heating system will be automatically regulated by 145 Powers individual room thermostats controlling 236 radiator valves on convectors and direct radiation.

At Harvard, Massachusetts Institute of Technology and many other famous institutions Powers systems will be found giving dependable low-cost-maintenance-control after years of reliable service.

When problems of temperature and humidity control arise why not let POWERS work out the correct solution? Our more than 60 years of experience gained in all types of important buildings should be helpful to you. Phone or write our nearest office. There is no obligation.

POWERS CONTROL

Since 1891

(a93)

OFFICES IN OVER 50 CITIES **THE POWERS REGULATOR COMPANY** SKOKIE ILLINOIS

Small in Size and Price—

Here's Utility's new baby that makes tough installations easy—the new *Horizontal* 65,000 BTU and 90,000 BTU Forced Air Furnaces. They're small in size and their flexibility will make them popular with dealers and customers alike. They will fit in most attics or, in many cases, under the house. They are ideal for both new and replacement sales. Utility's Horizontal Forced Air Furnaces don't take up precious floor space . . . are easy to install . . . and highly competitive in price. And your net will be greater because there's less ducting, less installation expense.

Giants in Performance!

Utility Horizontal Forced Air Furnaces give large home heating at small home cost, plus years of economical, dependable service. And these models are easiest to sell because of these many superior sales points: Super-quiet Dy-Rekt* Drive Blower . . . automatic controls . . . even heat distribution to all parts of the house . . . semi-compensating air delivery . . . blower can be used independent of heating unit for home ventilation in hot weather . . . trouble-free operation. And they save *you* money because they require fewer costly service call-backs!

**Registered*

SEE THE COMPLETE UTILITY LINE AT YOUR DEALERS

Blowers | Air Coolers | Automatic Gas Ranges

UTILITY APPLIANCE CORP. C-952
4851 S. Alameda St., Los Angeles 58, Calif.

Please send me FREE information about Utility's new HORIZONTAL FORCED AIR FURNACES and the *complete* Utility Heating line.

Name _____

Address _____

City _____ *Zone* *State* _____

Deliveries NOW!

UTILITY TRADE MARK*

Guaranteed air delivery

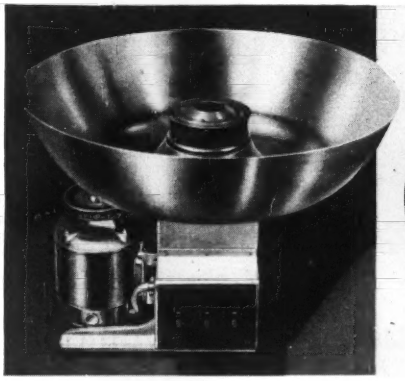
UTILITY APPLIANCE CORP. 4851 SOUTH ALAMEDA STREET LOS ANGELES 58, CALIFORNIA

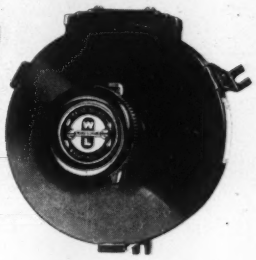
MANUFACTURERS OF AIR COOLERS, BLOWERS, GAFFERS & SATTLER AND OCCIDENTAL AUTOMATIC GAS RANGES

The Electric Candy Floss Machine Co.

"A pink cotton candy machine rheostat must provide exact temperature control"

says John G. Pettyjohn,
John G. Pettyjohn Company, Knoxville, Tennessee,
representative for Ward Leonard Electric Company.





Spinning sugar into fine, fluffy floss for pink cotton candy requires precise heat control. Unless a high degree of heat is closely controlled, candy becomes too thick or too thin. Also, since these machines are used at circuses, traveling carnivals, resorts, and similar places, machines must be able to compensate for variance in voltage and surrounding temperature, depending upon the location.

The Electric Candy Floss Machine Company, Nashville, Tenn., uses Ward Leonard VITROHM plate rheostats in the heater circuits on the spinner heads of their new super deluxe candy floss machines for two reasons: (1) VITROHM rheostats are the only rheostats they have found that would stand up and give good service, (2) they are able to get a much better grade of candy.

Ward Leonard rheostats are available in several multiples of resistance values to meet various operating conditions. Special purpose rheostats requiring non-standard values and tapers can also be supplied.

Ward Leonard's engineering department is always ready to work with you to design or recommend the most economical rheostat for your particular application. Write for Ward Leonard Rheostat Bulletin 60A.

DISTRICT OFFICES AND REPRESENTATIVES

Atlanta 5, Georgia	C. B. Rogers and Associates
Baltimore 18, Md.	Durling Electric Co.
Charlotte 1, N. C.	James L. Highsmith & Co.
Chicago 4, Illinois	Ward Leonard Electric Co.
Cincinnati 2, Ohio	Sheldon Storer and Assoc.
Cleveland 14, Ohio	The Ambos-Jones Co.
Corpus Christi, Texas	Branco-Krachy Co., Inc.
Denver 2, Colorado	Mark G. Mueller
Detroit 21, Michigan	Jesse W. Eakins Co.
Hartford 6, Conn.	Ward Leonard Electric Co.
Houston 1, Texas	Branco-Krachy Co., Inc.
Kansas City 2, Mo.	Maury E. Bettis Co.
Knoxville, Tennessee	John G. Pettyjohn
Los Angeles 13, Calif.	Ward Leonard Electric Co.
Memphis 3, Tenn.	E. E. Torkell
Minneapolis 5, Minn.	Marvin H. Kirkeby
Newark 2, N. J.	Ward Leonard Electric Co.
New Orleans 13, La.	Electron Engineering Co.
Philadelphia 17, Pa.	Ward Leonard Electric Co.
Pittsburgh 16, Pa.	W. A. Bittner
Roanoke, Virginia	Lynn H. Morris
Rochester 7, N. Y.	Ward Leonard Electric Co.
St. Louis 10, Mo.	Ward Leonard Electric Co.
Salt Lake City 1, Utah	Leonard M. Slusser
San Antonio, Texas	Branco-Krachy Co., Inc.
San Francisco 3, Calif.	L. F. Church Co.
Seattle 4, Wash.	Northwestern Agencies, Inc.
Tucson, Arizona	Central Station Equipment Co.
Washington 5, D. C.	Federal Engineering Co., Inc.

CANADA

Edmonton, Alta.	D. M. Fraser, Ltd.
Halifax, N. S.	D. M. Fraser, Ltd.
Montreal 25, P. Q.	D. M. Fraser, Ltd.
Toronto 1, Ont.	D. M. Fraser, Ltd.
Vancouver, B. C.	D. M. Fraser, Ltd.
Winnipeg, Man.	D. M. Fraser, Ltd.

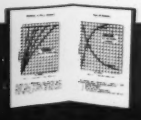
EXPORT

New York 4, N. Y.	Ad. Auriema, Inc.

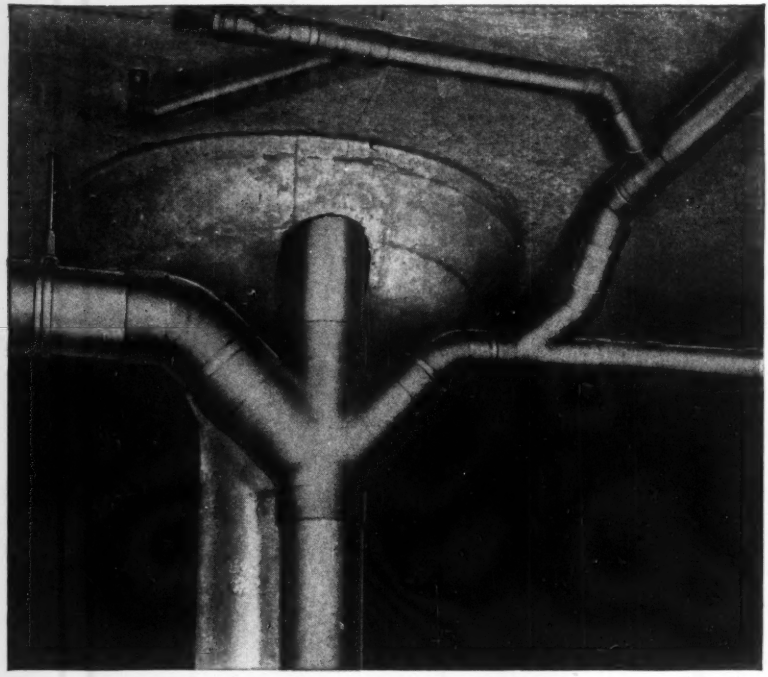
WARD LEONARD ELECTRIC COMPANY
MOUNT VERNON, NEW YORK

RHEOSTATS RELAYS MOTOR CONTROLS CHROMASTER

Result-Engineered Controls Since 1892



Ward Leonard's complete engineering textbook, "Handbook of Power Resistors," $3. per copy.



only pipelines of copper give **all** these advantages

Whether you require capillary tubing as small as .025" I.D., or process conveying lines as large as 26" I.D., ANACONDA Seamless Copper Tubes offer basic advantages presented by no other single piping material.

Copper tubes are strong, rustproof, corrosion-resistant. They remain smooth and clean inside. No rusty scale can form to accumulate built-up deposits. As a result, pumping costs are lower and smaller tubes may be used, since no allowance need be figured for rust-clogging.

Modern solder-type connections eliminate threading. Strong, sound, free-flowing joints are made at lower cost and with lighter tubes. Similarly, copper tube lines can be taken down, moved or have new connections cut in faster. With soft-annealed tubes, bends may be made to clear obstructions, further reducing installation costs.

For reliable service on COPPER and COPPER ALLOYS call an Anaconda Distributor. The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

AnacondA Copper Tubes are stocked by wholesale distributors from coast to coast. Types K and L in standard sizes are furnished soft in 60-ft. coils, and hard and soft in 20-ft. straight lengths. Type M Tubes 1¼" and larger are furnished hard in 20-ft. straight lengths for waste, vent and drain lines.

modern piping calls for ANACONDA® copper tubes

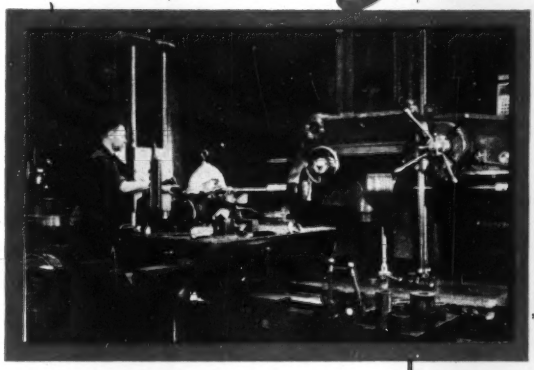
Fine Machine Work

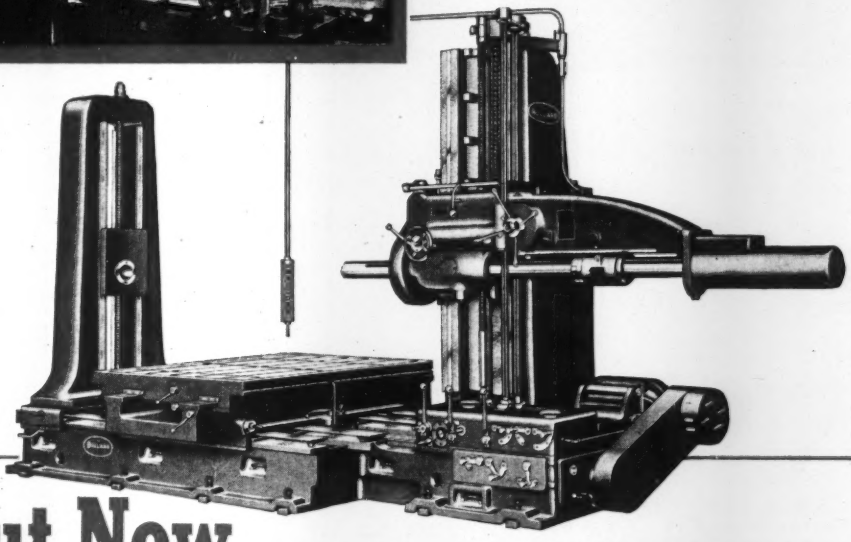
"Decides the Quality of a Pump"

. . says
Warren Steam Pump Co.
of Warren, Mass.

testimonial enough
for their five

Universal
Boring Machines





But Now... Universal Redesigned by Bullard offers a broad 4-way bed Horizontal Boring, Milling and Drilling machine with an even Higher Degree of Rigidity, Accuracy and Serviceability.

Call in a Bullard Engineer or write for complete details describing the many points of Redesign and Modernizing.

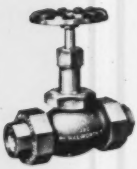
Bullardize your plant for Higher Efficiency.

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

Pressure-Seal Cast Steel Gate Valve

Small Cast Steel Angle and Y-Globe Valves for high-pressure service

Walseal Bronze Strainer



Walseal Bronze Globe Valve

Walseal Bronze Elbow

Walseal Bronze Union End Tee

Walworth is proud to be aboard the S. S. United States

When the United States Lines, the Newport News Shipbuilding & Dry Dock Company, and Gibbs & Cox, Inc., naval architects, join forces to build the fastest, safest and most modern liner the world has ever seen, the selected materials and components have to be top quality. Walworth Pressure-Seal Cast Steel Gate, Globe, and Angle Valves, and Walworth Small Cast Steel Angle and Y-Globe Valves for high-pressure service are installed in the main steam lines of the S. S. United States. Brass and copper lines use large numbers of Walseal valves, fittings, strainers, and unions.

Knowing that Walworth valves and fittings are a vital part of the power arteries aboard this great ship, the proudest moment of Walworth's 110 years of manufacturing experience came when the new Queen of the Sea broke both the east and west trans-Atlantic speed records.

As we present our compliments to Commodore Manning and his crew, to the Newport News Shipbuilding & Dry Dock Company and its men, and to William F. Gibbs and his staff, we also compliment the men and women of the Walworth Company who gave of themselves to put quality into our products and this quality ship.

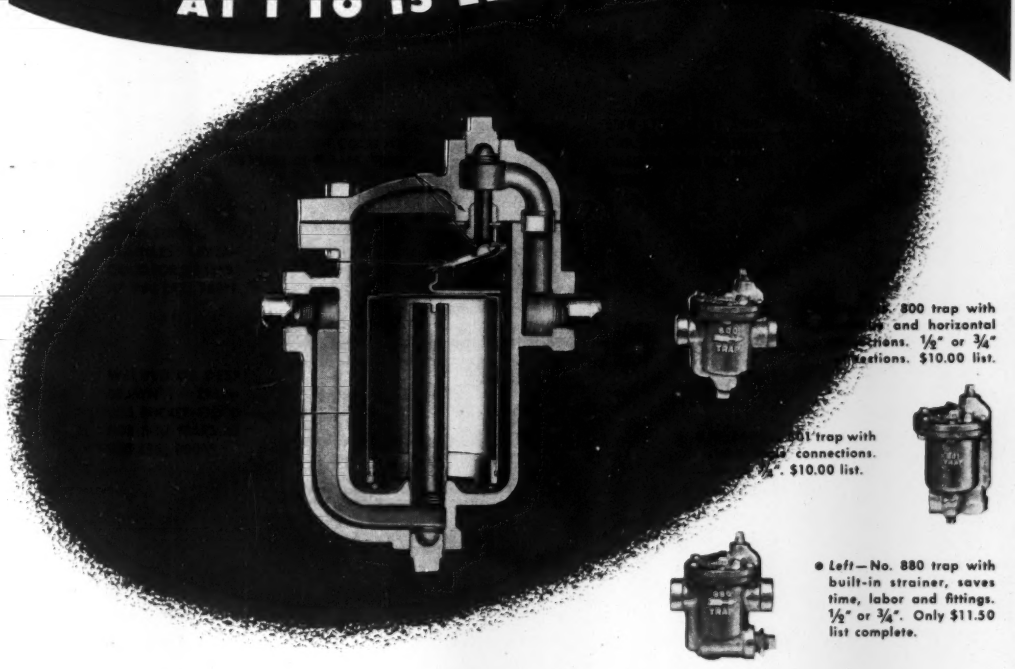
WALWORTH

valves • fittings • pipe wrenches

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

HOW LONG WILL THIS TRAP LAST AT 1 TO 15 LBS. PRESSURE?



. 800 trap with and horizontal tions. ½" or ¾" sections. $10.00 list.

51 trap with connections. ". $10.00 list.

● *Left*—No. 880 trap with built-in strainer, saves time, labor and fittings. ½" or ¾". Only $11.50 list complete.

HERE'S A TRAP mechanism for low pressures that is identical in design, materials and workmanship to that used in traps for pressures to 950 lbs., temperatures to 900°F.* You know that it will last a LONG TIME with an absolute minimum of maintenance on a low pressure heating system.

Users report: "4 to 5 years without service"..."10 years—no repairs"... "30% to 50% less maintenance."

Add to the high quality, low maintenance features of this trap the following benefits: large air handling capacity (blast buckets with auxiliary thermic vents where you need them)... self-scrubbing action... immunity to corrosion... ease of installation—and you have an unbeatable trap for any heating job.

Call your nearby Armstrong Representative for details and prices.

ARMSTRONG MACHINE WORKS
874 Maple Street, Three Rivers, Michigan

**Mass production of traps for all pressures makes it possible to deliver this mechanism at no premium in price.*

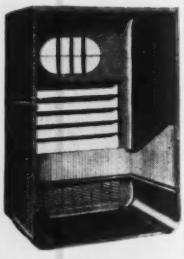
SEND FOR CATALOG...

The Armstrong Steam Trap Book gives complete catalog information on Armstrong traps, explains trap selection and installation. You are welcome to a copy.

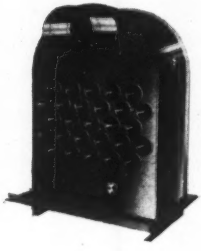
ARMSTRONG STEAM TRAPS

Announcing the most GAS

These Features Mean Extra Years



Rugged Construction — Heavier gauge metal throughout means extra safety, extra years of service. For instance, 14 gauge end sheets and 16 gauge tubes in heat exchanger.



Built Like a Boiler — No gaskets, no furnace cement. Tubular construction engineered for maximum heating efficiency. Beaded and flanged connections, throughout.

MANUFACTURING ENGINEERS OF HEATING, VENTILATING

rugged TRANE unit heater ever built!

NOW! A HEATER BUILT LIKE A BOILER!

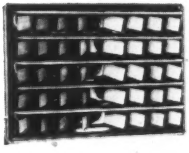
Heavier gauge steel throughout! Bigger, more powerful motor! New *steel* fan designed especially for unit heater application! Welded seams all around. Durable "Bonderized" finish.

Even the joints in the heat exchanger have come in for special treatment. TRANE has *eliminated* gaskets, furnace cement and other joining materials by using beaded and flanged connections to give you trouble-free joints as permanent as steel itself.

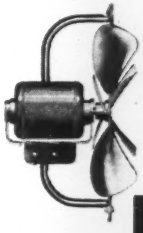
Features like these and other carefully engineered, exclusive details make it possible for you to hang gas heating from the ceiling more efficiently, more economically than ever before.

Have all the facts on hand when you plan your next gas unit heating job. Get the new TRANE Gas Unit Heater Bulletin just off the press. Write TRANE, La Crosse, Wisconsin, for the name of the TRANE Gas Unit Heater Distributor in your area.

of Trouble-Free, Thrifty Operation



Heat Where You Want It—Extra control of heat placement with patented TRANE Louver Fin Diffuser. Exclusive optional feature.



Special Trane Fan—Engineered specifically for unit heaters. Wide blade doesn't *chop* air. It *pushes*—quietly!

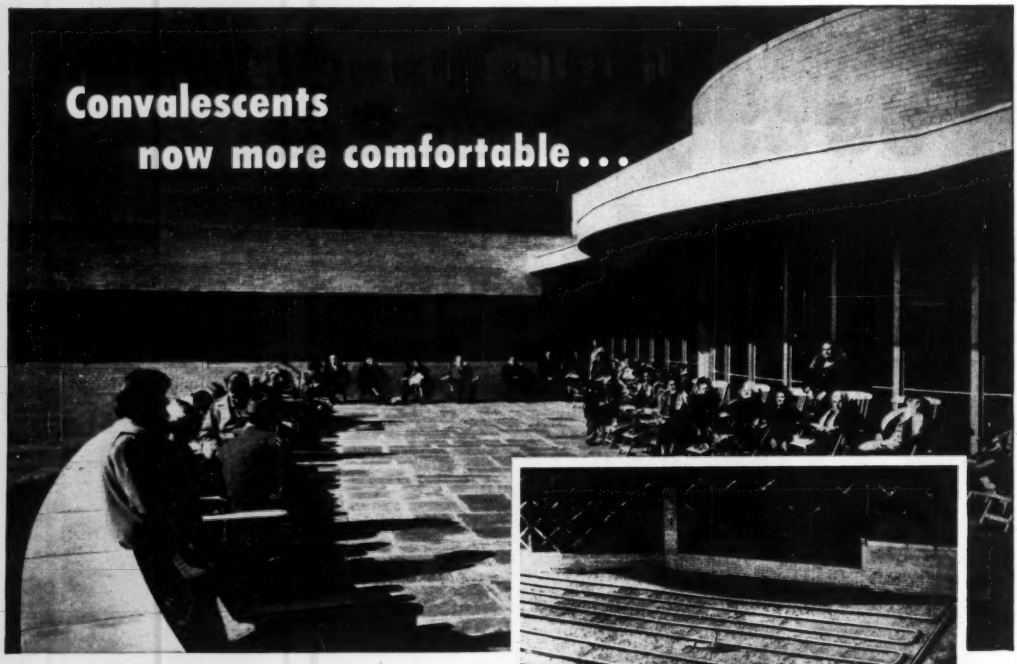
A. G. A. and Underwriters' Approved—New TRANE Gas Unit Heaters have been tested and approved by American Gas Association and Underwriters' Laboratories.

AND AIR CONDITIONING EQUIPMENT

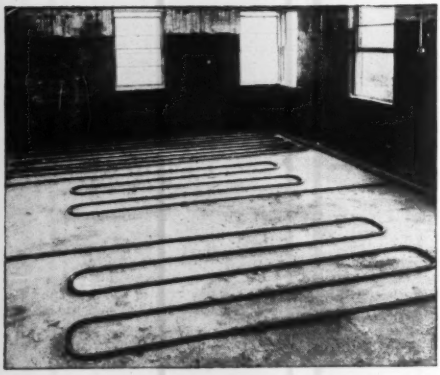
TRANE

THE TRANE COMPANY, LA CROSSE, WIS.
Eastern Mfg. Division, Scranton, Pa.
Trane Company of Canada, Ltd., Toronto
Offices in 80 U.S. and 14 Canadian Cities

Convalescents now more comfortable...



with radiant heating and snow melting



● You'll look a long time before you find a building more ideally suited to the needs of the convalescent. It's the Brooklyn Jewish Home for Convalescents in Far Rockaway, N. Y.

They used 27 tons of National Steel Pipe for the radiant heating and snow melting installation. Every room has radiant heat—the ideal heating system for the aged and the ill.

To make full use of the terrace year round, a snow melting system was installed using National Steel Pipe. Now, patients can utilize the sun-bathed terrace in all but the very worst weather.

National Steel Pipe has been used for many radiant heating systems in homes, institutions and industrial plants. The pipe is made to the same rigid standards that have made National the preferred pipe for conventional heating for over *60 years*.

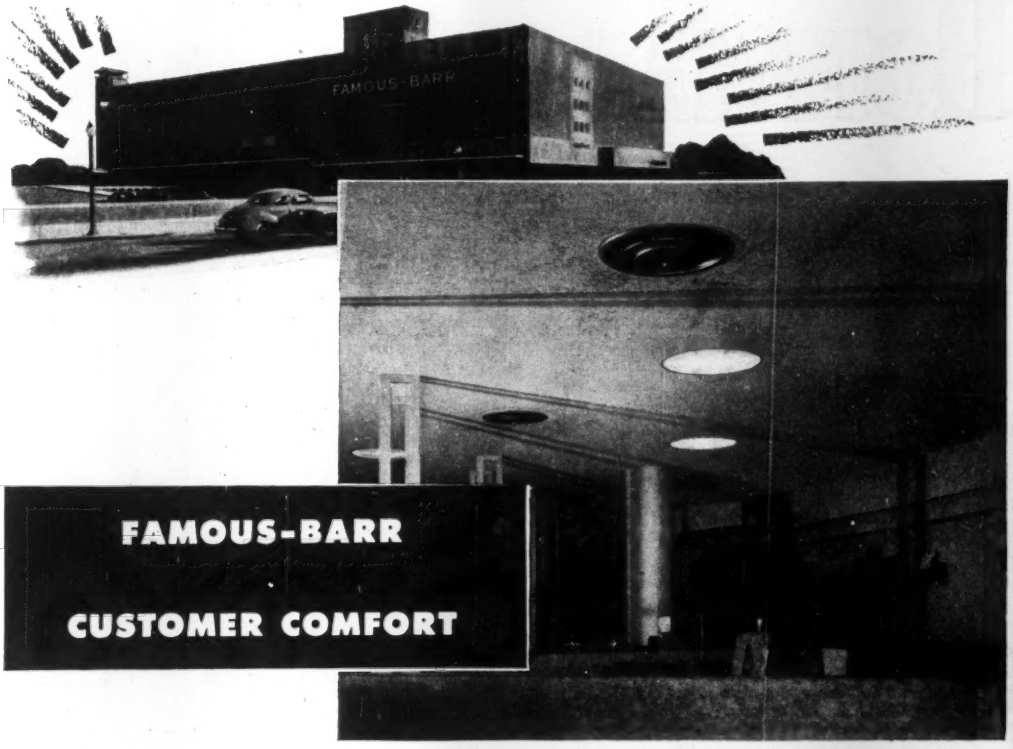
If you have any questions regarding pipe for radiant heating or snow melting, make use of our wide experience. We think we'll be able to help you.

NATIONAL TUBE DIVISION, UNITED STATES STEEL COMPANY, PITTSBURGH, PA.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S NATIONAL Steel PIPE

USS

UNITED STATES STEEL



FAMOUS-BARR

CUSTOMER COMFORT

with **kno·draft** adjustable air diffusers

Keep customers comfortable and department store sales go up. That's been proved time and again. So, in the new Southtown store of Famous-Barr Co., St. Louis, you'll find Kno-Draft *Adjustable* Air Diffusers.

Kno-Draft *Adjustable* Air Diffusers can be set for exact control of both volume and direction of air flow. This means even distribution of heat, *without drafts*, throughout the conditioned area. And because they are adjustable *after* installation, it's no trouble to vary the air pattern when changed conditions call for it. This feature also eliminates much preliminary figuring by engineers and installers — makes a foolproof system.

Note, too, the handsome appearance of Kno-Draft *Adjustable* Air Diffusers. They are as unobtrusive as they are efficient — go with any surroundings, either in their natural spun metal finish or painted to match the ceiling. There are types and sizes to meet every need. Mail the coupon for full information today.

TRADE MARK "KNO-DRAFT" REG. U. S. PAT. OFF.

W.B.CONNOR ENGINEERING CORP

Danbury, Connecticut

Air Diffusion · Air Purification · Air Recovery

In Canada: Douglas Engineering Co., Ltd.,
190 Murray Street, Montreal 3, P. Q.

W. B. CONNOR ENGINEERING CORP.
Dept. G-92, Danbury, Connecticut

Please send me the *new edition* of the Kno-Draft Data Book—without obligation, of course.

Name.....

Position.....

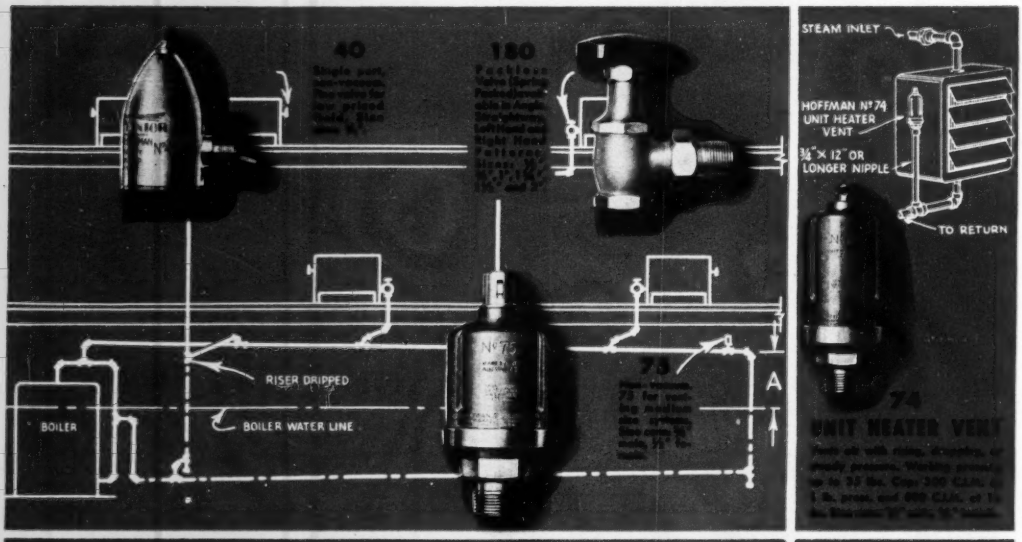
Company.....

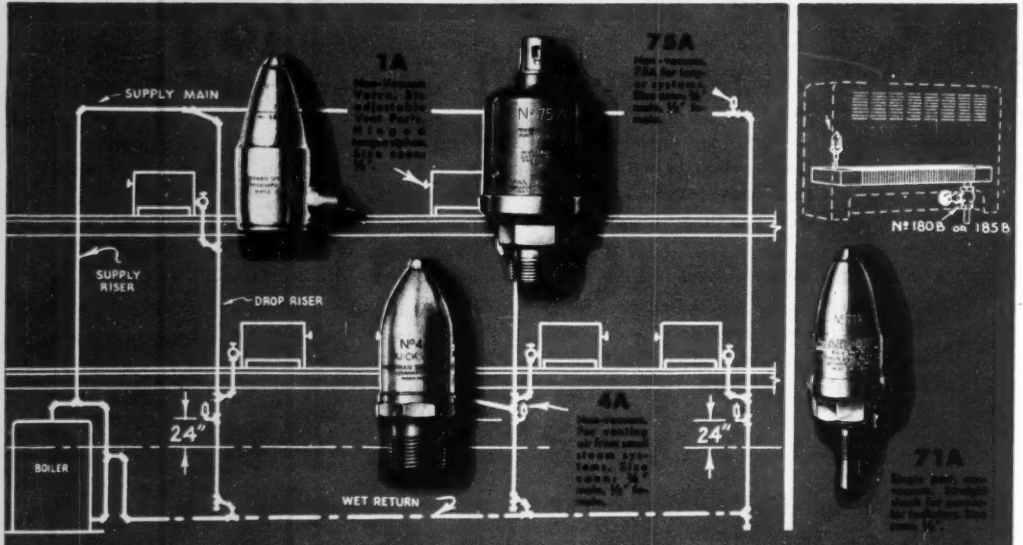
Street.....

City.....**Zone**.....**State**.....

HOFFMAN VENTING VALVES

A TYPE FOR EVERY HEATING SYSTEM



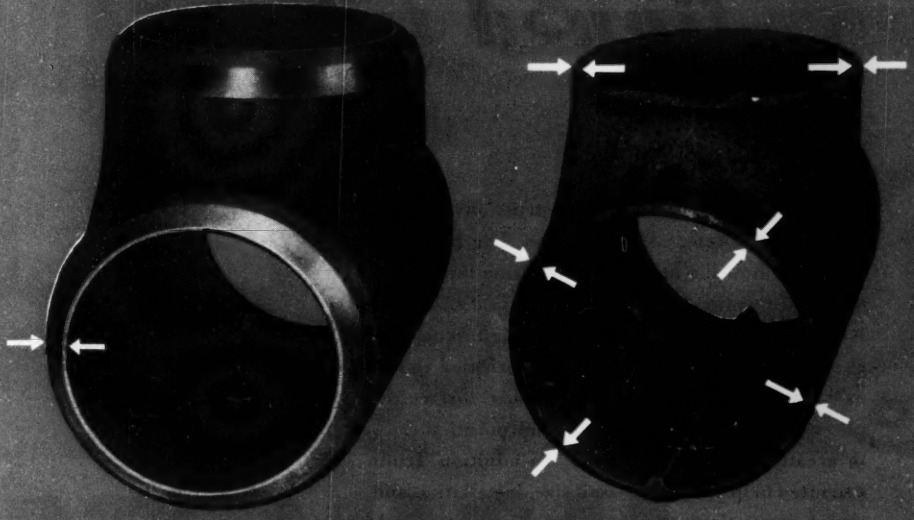


Again it's time to modernize millions of air-bound, sunborn radiators and harvest quick profits on a turnover of Hoffman Vent Valves. For, *to guarding comfort and fuel*, the first step in proper venting . . . a function Hoffman Valves are famous for, backed by forty years of specialized experience, exclusive features and precision workmanship. There is a Hoffman Valve for every need—radiators, convectors, unit heaters, main vent valves for steam and hot water heating systems. The heating season is right ahead . . . It's time to order the Hoffman Valves you'll need for early modernizing jobs. For complete information on Hoffman Radiator and Main Vents, contact your wholesaler, or write

HOFFMAN SPECIALTY MFG. CORP. • 1001 York Street, Indianapolis 7, Indiana

Makers of Hoffman Heat Water Heating Systems, Vacuum and Condensation Pumps — Sold by Leading Wholesalers of Heating and Plumbing Equipment

EVIDENCE OF SUPERIORITY IN *Corrosive Service*



BEFORE *Midwest 4" extra heavy weight, carbon steel tee showing original wall thickness of tee at right before it was accidentally subjected to corrosive conditions.*

AFTER *When straight pipe in line had failed from corrosion, this Midwest tee was removed. Note amount and uniformity of wall thickness remaining.*

A valve leaked or somebody opened it by mistake . . . so the Midwest Tee shown above was subjected to dilute hydrofluoric acid in addition to its normal service in a 300° F. hydrocarbon line on an alkylation unit.

The highly corrosive acid caused failure of the straight pipe . . . so the entire line had to be replaced. When cut out of the line, the Midwest Tee was found to have a considerable (and uniform) wall thickness. There was no selective corrosion and the weld held up even better than the parent metal.

This was not special alloy made to resist corrosion, but regular Grade "A" carbon steel . . . the same as the new tee shown left above. We do not, of course, recommend carbon steel for corrosive conditions, but, in emergency, it gives good account of itself.

The exclusive Midwest manufacturing process produces fittings of superior metallurgical properties. The metal is worked in compression . . . it is not stretched or extruded, and distribution is uniform. After forming and welding, the fitting is stress-relieved. For further information, write us for a copy of Catalog 48.

MIDWEST PIPING & SUPPLY CO., INC.

Main Office: 1450 South Second Street, St. Louis 4, Mo.

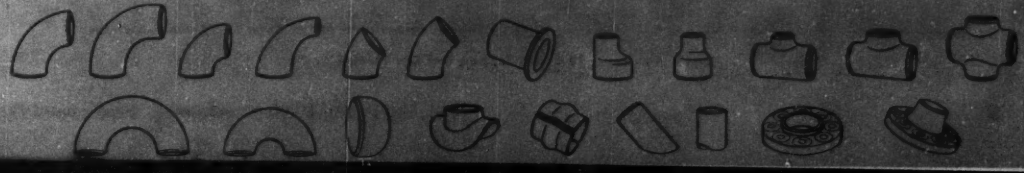
Plants: St. Louis, Passaic, Los Angeles and Boston

Sales Offices: New York 7—30 Church St. • Chicago 3—79 West Monroe St.
Los Angeles 33—520 Anderson St. • Houston 2—1213 Capitol Ave.
Tulsa 3—224 Wright Bldg. • Boston 27—426 First St.

STOCKING DISTRIBUTORS IN PRINCIPAL CITIES

MIDWEST WELDING FITTINGS

IMPROVE DESIGN AND REDUCE COSTS

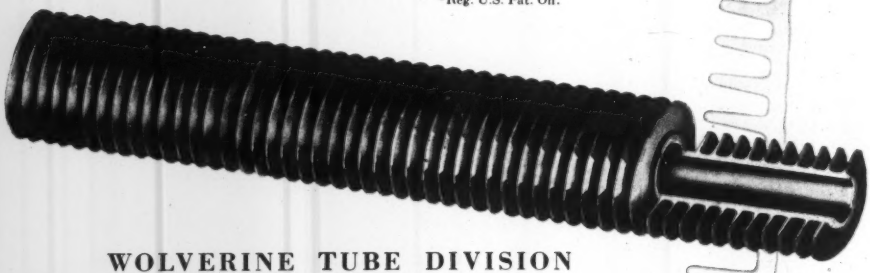


all one piece ...*finned tube*

The fins are extruded from the tube itself

These two views show the construction of Wolverine Trufin* — the integral finned tube. The large drawing illustrates how the fins are formed from the wall of the tube and remain a part of it. Thus, Trufin's efficiency is unaffected by vibration or sudden temperature changes. This finned tube can be fabricated as easily as plain tube. Trufin has an outside surface area many times that of plain tube and points the way to greatly increased efficiency. In addition Trufin can often help you reduce unit size, installation and maintenance time, thus lowering your costs. Find out about Trufin, the integral finned tube, and its relation to your own heat transfer application. Available in a variety of sizes, fin spacings and alloys. Send for your copy of the new brochure, Wolverine Fabricated Parts.

*Reg. U.S. Pat. Off.



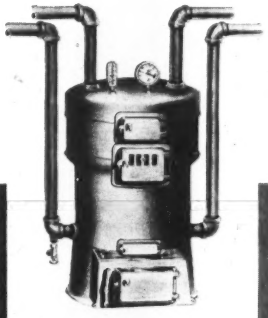
WOLVERINE TUBE DIVISION
Calumet and Hecla Consolidated Copper Company
Incorporated
Manufacturers of tubing exclusively
1419 CENTRAL AVENUE • DETROIT 9, MICHIGAN

Wolverine Mill Depots: DETROIT, MICH. • DECATUR, ALA. • HOUSTON, TEXAS • LOS ANGELES, CALIF. • LONG ISLAND CITY, N. Y. • PHILADELPHIA, PA. • PROVIDENCE, R. I. • ST. LOUIS, MO.

Plants in Detroit, Michigan and Decatur, Alabama; Sales Offices in Principal Cities

Wolverine Trufin and the Wolverine Spun End Process available in Canada through the Trufin Tube Co., London, Ontario.

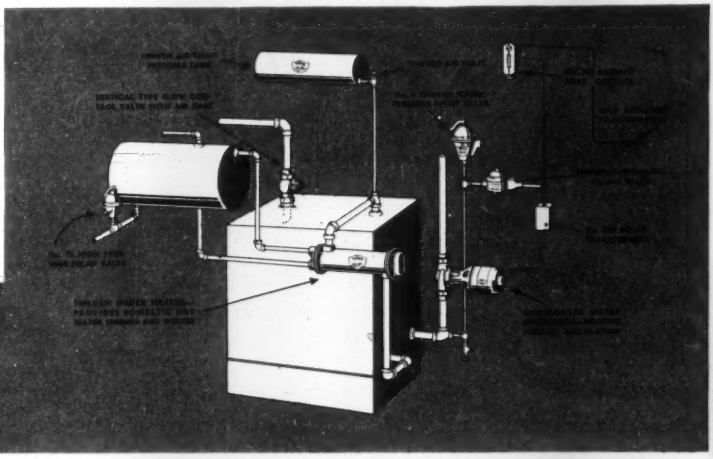
Export Department, 13 E. 40th St., New York City 16, N. Y.



There are many old installations like this in every community just waiting for you! Go after them with a Thrush modernization plan.

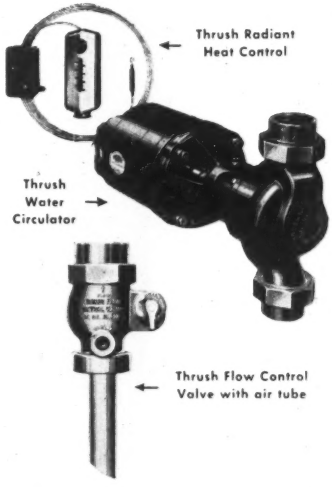
Modernize old heating plants now . . . with Thrush Equipment

Any hot water heating system can be converted easily into a modern, forced circulating heating plant with a few inexpensive Thrush units.



THRUSH . . .

Flow Control System of Radiant Hot Water Heat!



THRUSH Flow Control System installed on old hot water heating plants gives controlled comfort in every room in the house. Many homeowners would modernize if they knew it was possible to convert to a modern system at such moderate cost. A Thrush Water Circulator with Thrush Flow Control Valve will provide positive circulation without overheating. Thrush Water Heater will assure a plentiful supply of domestic hot water from the same boiler in summer and the whole year through. If you are not now installing Thrush equipment, see your wholesaler or write Department E-9.

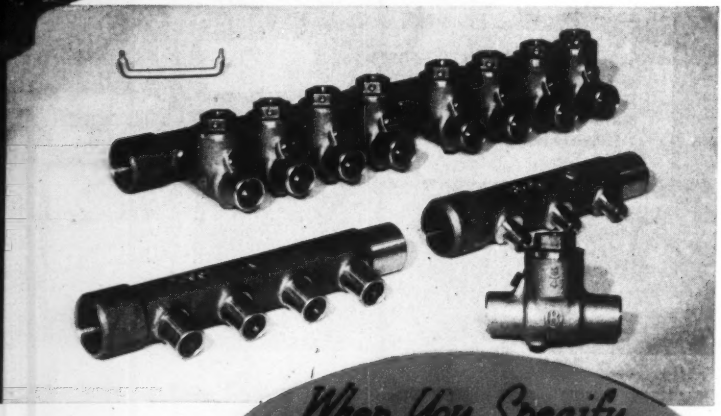
H. A. THRUSH & COMPANY
PERU • INDIANA

Balancing is easier...

AND COSTS LESS

Equatemps can be furnished for ⅜, ½, and ¾-inch tubing and for 1-inch threaded pipe ends.

Build a header the modern way with Equatemp Manifold units and Equatemp solder-type valves. Available with 3 or 4 outlets, manifolds may be slipped together to form headers of any desired length. Valves and manifolds sold separately.



When You Specify

EQUA=TEMP

RADIANT HEAT VALVES

Save the cost of extra valves and extra fittings by specifying O-B Equatemps on your next radiant job. These versatile new valves do the whole job—balancing, venting, and draining. Best of all, Equatemps can be shut off leaktight on individual lines. A well drilled in the valve stem, permits flow to be balanced by thermometer method. Once proper balancing has been achieved, settings can be locked to prevent tampering by the "home plumber."

For additional information about Equatemps, contact your local O-B valve distributor or send in coupon below requesting illustrated folder.

EASY TO REGULATE - EASY TO INSTALL

Equatemps are ideal for all types of hot water radiant heating systems—floors, ceilings, panels, convectors, or baseboard systems.

Try them in—

- **Homes**
- **Apartments**
- **Hotels**
- **Hatcheries and Farm Buildings**
- **Motor Courts**
- **Snow Melting**

Please send me Equatemp folder 1214-V

Name .....

Company .....

Street .....

City ..... State .....

Ohio Brass

MANSFIELD • OHIO

4209-V

The Easy, Low-Cost, Better Way to

INSULATE

Underground Heated Piping

regardless of size, number, or arrangement

Placing "Z"-Crete Insulation, 2-pipe conduit.

Conduit containing 10 pipes at famous Mid-Western hospital. Pipes anchored to base, support blocks in place prior to pouring of "Z"-Crete. "Z"-Crete system is adaptable to any pipe layout.

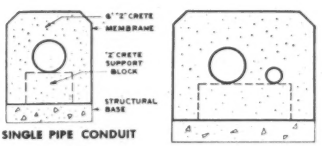
"Z"crete® THE MODERN MONOLITHIC INSULATION

For the simplest single pipe system, or the most complex multiple pipe installation...

No pipe arrangement too tough for this versatile insulation—"Z"-*Crete* affords permanent insulating efficiency—forms a solid, monolithic protection around one pipe or a dozen in the same conduit. Hundreds of thousands of feet in use, in every part of the country, every soil condition. Efficient—because there's six inches of insulation between pipe and outside of conduit. Permanent—made of inorganic, rot-proof, insulating concrete... monolithic pour assures restricted water movement around the assembly. And you'll find it's usually the most economical system to install.

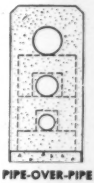
A new booklet, just out, gives full information on this modern method of insulating underground heated piping. Write, wire or phone for a copy now—no obligation, of course.

Use "Z"-Crete for any heated underground system

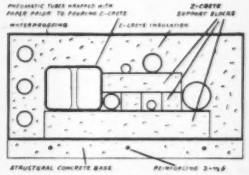


SINGLE PIPE CONDUIT

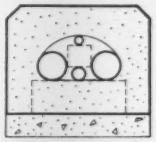
2-PIPE CONDUIT



PIPE-OVER-PIPE



MULTIPLE PIPE CONDUIT



MULTIPLE PIPE CONDUIT WITH STEAM TRACER

"Z"crete® DIVISION

ZONOLITE COMPANY

135 S. LaSalle St. • Phone: CEntral 6-5885 • Chicago 3, Ill.

"Z"-Crete is sold and installed only by experienced, licensed applicators, under U. S. and Canadian Letters of Patent. There is one near you. Name furnished with your copy of "Z"-Crete booklet.

MAIL COUPON FOR NEW FREE BOOKLET

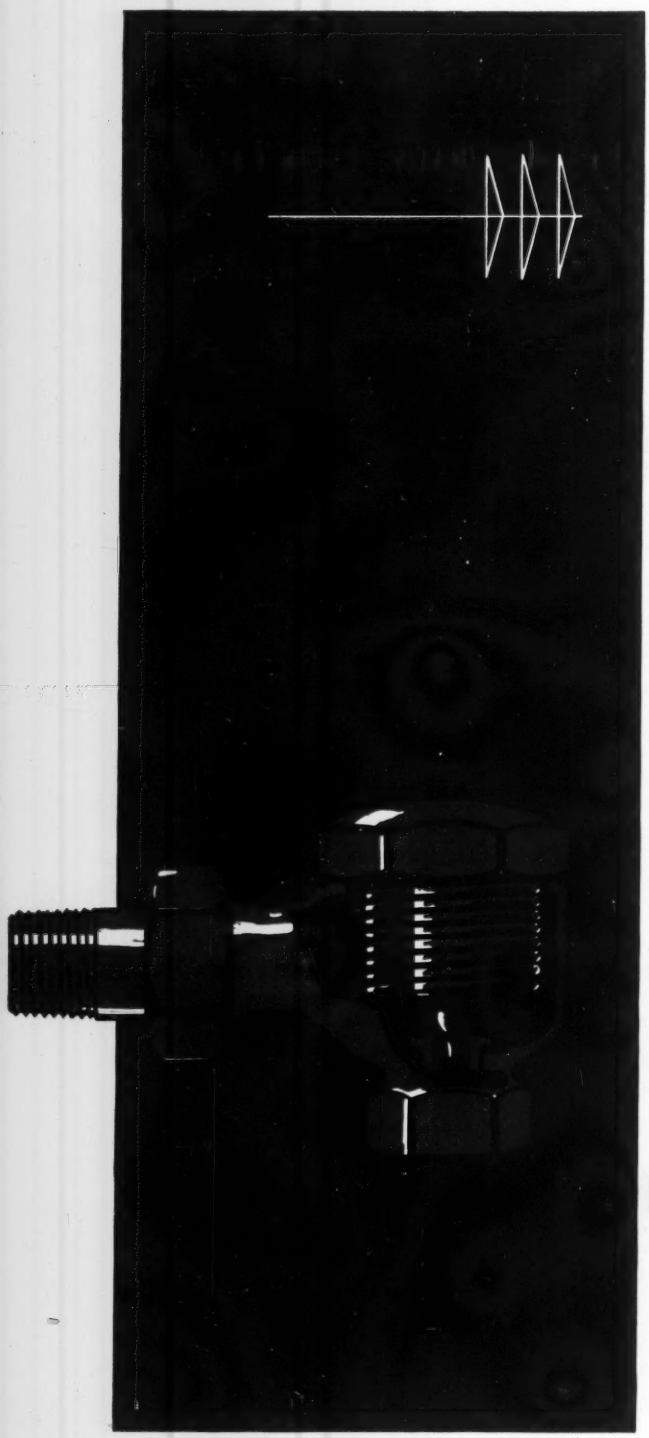
"Z"-Crete Division
ZONOLITE COMPANY, Dept. HPAC-92
135 S. LaSalle St., Chicago 3, Illinois

Please rush me your new "Z"-Crete Booklet, for full details and specifications about this easier, better insulation of underground heated piping.

Name.....

Address.....

City.....*Zone*.....*State*.....



WHY?

WHY IMPORTANT?

. . . because more thermostatic steam traps are used in heating systems than any other type. The efficient operation of the heating system depends upon the selection of traps which will perform satisfactorily over a long period with a minimum of maintenance.

WHY DO ARCHITECTS AND ENGINEERS SPECIFY SARCO?

. . . because from experience they know that Sarco Thermostatic steam traps operate to the client's satisfaction.

WHY ARE SARCO TRAPS SUPERIOR?

. . . because of continuous laboratory research, rigid control of raw materials, master craftsmanship, careful inspection of component parts — all of which are manufactured in the Sarco plant . . . because each trap, before shipment, is tested under actual working conditions.

WHY DO CONTRACTORS PREFER SARCO?

. . . because they pay no premium for Sarco quality and performance . . . because they know that the first cost is the only cost. The *complete* Sarco line provides them with a single, dependable and reliable source of steam and hot water heating specialties and industrial controls described in **the Sarco heating bulletins.**

SARCO

sarco quality assures satisfaction

SARCO COMPANY, INC.
Empire State Bldg., New York 1, N.Y.
REPRESENTED IN PRINCIPAL CITIES
Sarco Canada Ltd., Toronto 8, Ont.

402

Wagner
ELECTRIC MOTORS
...the choice of leaders in industry

This magnetic part-winding increment starter can be furnished in combination with open-type, splash-proof, explosion-proof, or totally-enclosed fan-cooled motors—normal or high torque.

Wagner
Increment Motor and Starter "Package"

Here's the combination that meets locked current restrictions

The Wagner part-winding increment motor and starter combination provides an economical method of starting polyphase squirrel-cage motors in any application where reduced current draw at start is required or desirable. No auto-transformers or resistors are necessary.

Wagner polyphase motors for part-winding starting, both normal and high torque, are wound with two circuits in parallel. The magnetic type increment starter has two magnetic contactors. When the first contactor closes, the line is connected to one group of the motor windings and a pneumatic timer is started. After the desired time interval, the pneumatic timer closes the second magnetic contactor which connects the line to the other part of the motor winding. Using this motor and starter combination, the current drawn from the line is about 60 percent of the normal locked current of the motor. It has the advantage that the current taken from the line is not broken during the starting period, as is the case when auto-transformers or compensator-type starters are used.

Motors with manual type increment starters are also available.

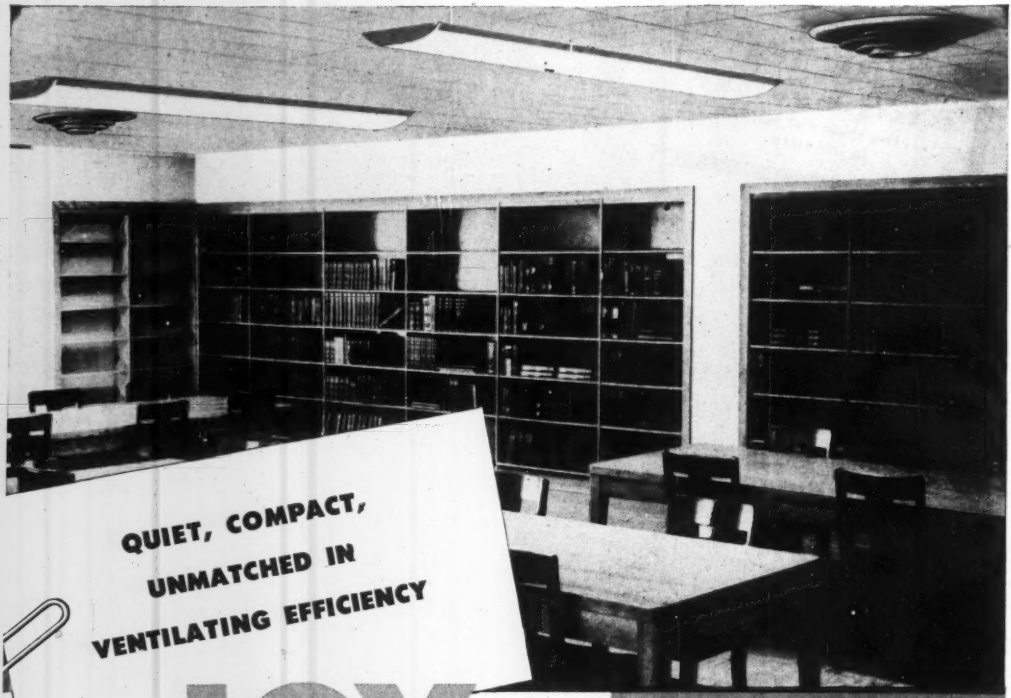
®Wagner Electric Corporation
EST. WE 1891

WAGNER ELECTRIC CORPORATION
6370 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

M52-16



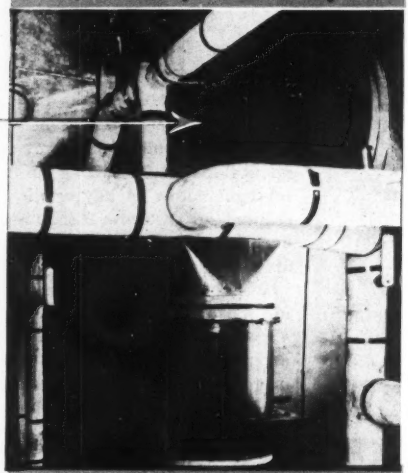
QUIET, COMPACT,
UNMATCHED IN
VENTILATING EFFICIENCY

JOY
AXIVANE® FANS

...BEST in Public Buildings

The compact, vaneaxial design of JOY AXIVANE Fans offers you important advantages of quiet, more efficient operation and savings on space requirements, installation costs, and power consumption. In addition, adjustable blades—a standard JOY feature—give you easy flexibility . . . you can make a simple on-the-job adjustment to meet new or changed conditions with greatest efficiency. ● For any ventilation job, check first with JOY—world's largest manufacturer of vaneaxial fans.

View in the Kansas Wesleyan Memorial Library, Salina, Kansas, ventilated with JOY Fans. Note ceiling louvers.



Wilson & Company, Engineers (Salina)—the consulting engineers—selected JOY Fans for this job. They mount right in the air duct, saving space and installation cost.

Write for Bulletin, or

Consult a Joy Engineer

W&D 13520

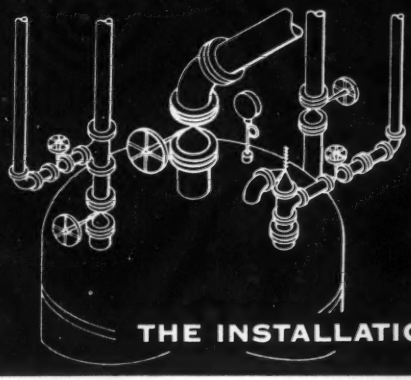
JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Are You Getting this Low-Cost Alloy Valve Service?

...on Starch Converters, for instance



THE INSTALLATION

Crane Ni-Resist valves on starch inlet lines to converters, Corn Products Refining Co. plant, Argo, Ill.

THE HISTORY

Valves in this service are constantly exposed to hydrochloric acid vapors under working pressure of 50 psi at approximately 280 deg. F. None of the valves formerly used lasted more than 2 to 3 weeks without repairs. In 3 to 4 months they had to be retired from service for rebuilding. Maintenance costs were excessively high.

To stop the trouble, the plant chose Crane Ni-Resist Alloy Cast Iron Gate Valves with Crane 18-8 Mo trim. Since being installed, these valves have operated at highest efficiency. On last inspection after 19 months' uninterrupted service, they were still in excellent condition.

VALVE SERVICE RATINGS

CORROSION-RESISTANCE:	Ni-Resist OK-18-8 Mo trim ideal
SUITABILITY:	Good for this mildly corrosive service
MAINTENANCE COST:	None-except routine stuffing box
SERVICE LIFE:	5 times longer to-date than other valves
OPERATING RESULTS:	Much less process interruption
PRICE:	In line
AVAILABILITY:	Regular Crane Catalog item

THE VALVE

Crane Ni-Resist Cast Iron Gate Valves combine, at moderate cost, the physical properties of quality cast iron with substantially greater resistance to corrosion, erosion, and wear. With 18-8 Mo Alloy trim, they step up valve efficiency on many chemical process services where common cast iron is inadequate. For recommendations, see your Crane Catalog, or call your Crane Representative.

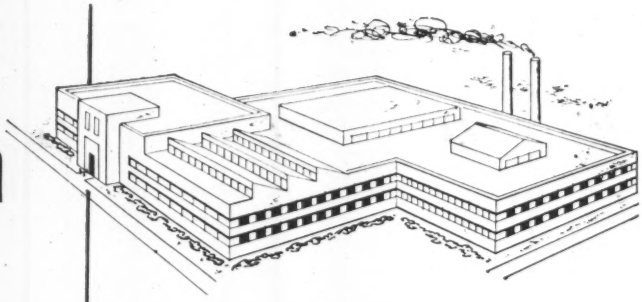
The Complete Crane Line Meets All Valve Needs. That's Why

More Crane Valves Are Used Than Any Other Make!

CRANE VALVES

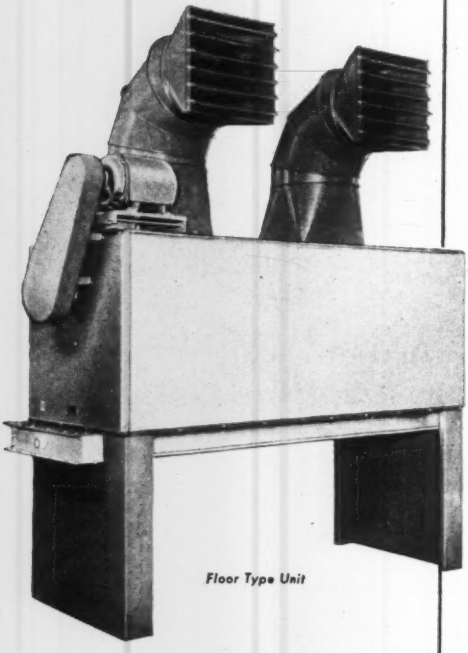
CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING



Large area heating...

WITH OR WITHOUT DUCT-WORK



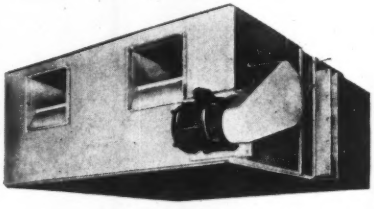
Floor Type Unit

McQuay

BLOWER-TYPE

Unit Heaters

Where heat must be diffused over large open areas, as in warehouses, garages and industrial plants, the McQuay Blower-Type Unit Heater has a wide application. Available in floor, horizontal, vertical, wall and inverted styles in 8 sizes, up to 1,600,000 Btu. Only McQuay can give you famous Ripple-Fin coils—the construction feature that assures maximum heat transfer efficiency. Representatives in principal cities. Write McQuay Inc., 1601 Broadway Street N.E., Minneapolis 13, Minnesota.

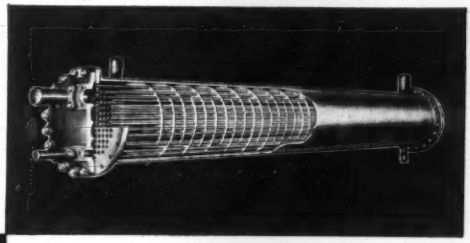


Horizontal Unit

McQuay INC.

HEATING
AIR CONDITIONING
REFRIGERATION

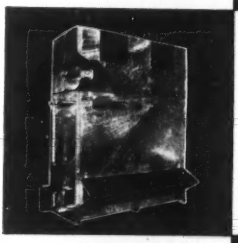
ACME PRODUCTS

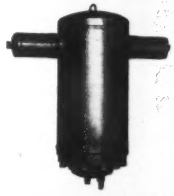


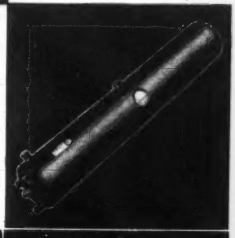
specify

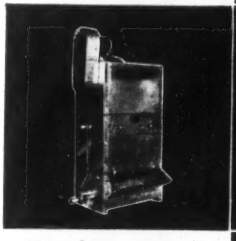
Acme

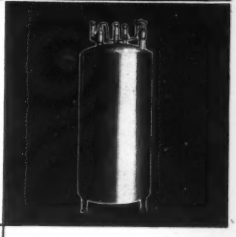
for engineering QUALITY and PERFORMANCE











When you specify "ACME" your equipment problem is greatly simplified, because the "ACME" Line is so complete that you will always find a product, model and size tailored to fit *eve ry*refrigeration requirement.

DRY-EX* WATER CHILLERS

More than 700 combinations of heads, baffle spacings and tube lengths, capacities from 1 to 200 tons. High rate of heat transfer; replaceable tubes; optional choice of single or dual circuits on 12" or larger; positive oil return without the need for oil separator; improved head design, tube hole grooving, tube rolling and baffle construction, make ACME DRY-EX* Water Chillers *truly outstanding.*

EVAPORATIVE CONDENSERS

for Freon or Ammonia in more than 30 models with capacities from 120,000 to 1,250,000 BTU/Hr. Separable fan sections. Provision for internally mounted receivers. Top vertical or front or rear discharge is optional and the air inlet can be located either front or rear. Vented, ball bearings fan shaft bearings can be mounted in any position.

ACME OIL SEPARATORS

Two separate series, Ten Models for Freon and six for Ammonia. ACME Oil Separators provide positive oil separation, are easily accessible, require practically no maintenance and help to muffle compressor discharge noise.

ACME CONDENSERS

Are noise-free, easy to clean and have leak proof joints. A complete line of Freon, Ammonia, Shell and Tube and Shell and Coil is offered. You can choose from more than 120 standard sizes to get the right model to meet *every* requirement.

ACME COOLING TOWERS

Available in capacities from 3 to 40 Tons. Induced draft design offers increased efficiency, with quiet operation and water saving features. Housing constructed from *11 and 14 Ga.* steel. NON-CORROSIVE Cooling Pads. Hot-dip galvanized *after* fabrication.

ACME HEAT EXCHANGERS

A new, more compact design featuring low suction pressure loss. Available in 11 models with capacities from 3 to 200 tons, and has a 13 to 1 ratio of gas to liquid side surface.

ACME LIQUID RECEIVERS

Offered in more than 70 standard sizes, from 6⅝"x18" to 30" x240", for Freon, Ammonia or other refrigerants — are easy to install and maintain.

HI-PEAK* WATER COOLERS

have large storage capacity and are galvanized *after* fabrication. Offered in seven standard sizes. For intermittent or continuous operation. EVERDUR Tank and factory insulation are optional.

BLO-COLD* INDUSTRIAL UNIT COOLERS

Five distinct series in more than 260 combinations with dry coil operation or continuous brine spray defrosting or for flooded Ammonia operation. Coils are easily accessible, fan sections are separable and large doors facilitate inspection. Hot Dip galvanized *after* fabrication.

Wherever refrigeration is used, ACME major components are in evidence and have deserved the preference of the Industry for more than 30 years — Write for Catalog and further information on any item required.

*Trade Mark

Acme INDUSTRIES, INC. JACKSON, MICHIGAN

CONTINUOUSLY SERVING THE REFRIGERATION INDUSTRY SINCE 1914

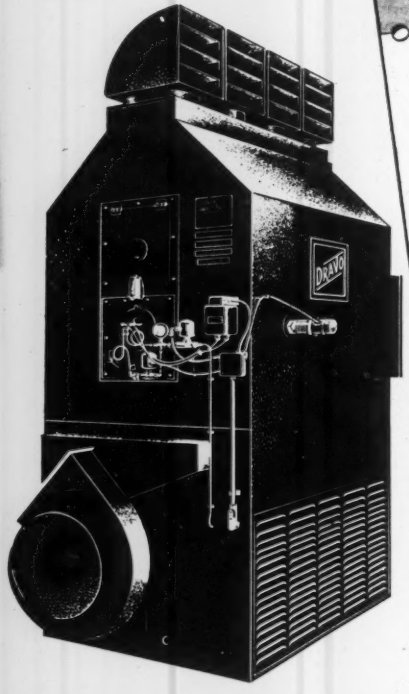
Facts AVAILABLE TO YOU ABOUT..

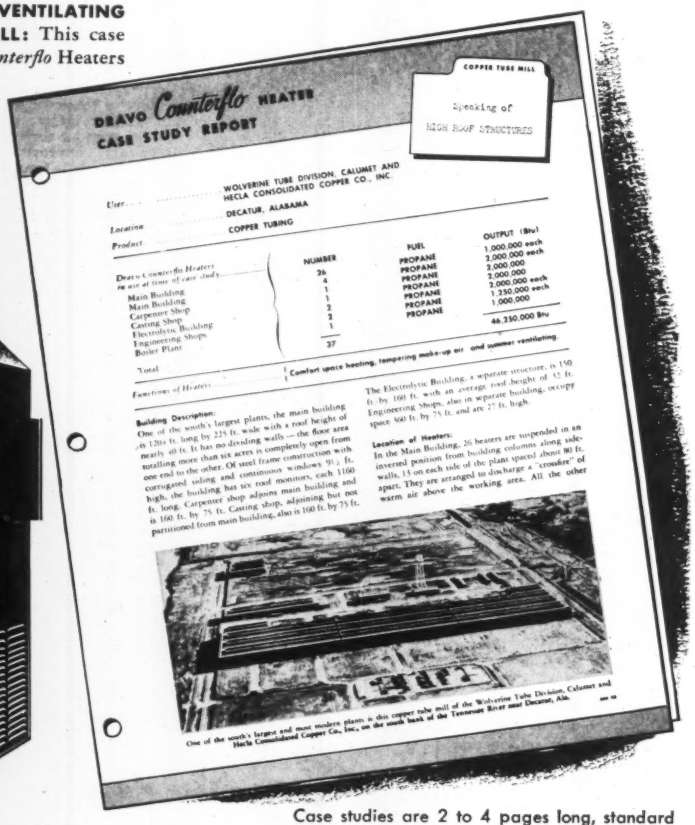
IN THESE *FREE* CASE STUDIES OF ACTUAL INSTALLATIONS...

Complete information—names, diagrams and photographs, along with the results obtained by using Dravo Heaters—is provided in detailed case studies, covering a wide variety of heating problems in many types of industrial buildings. If you buy, specify or recommend space heating equipment, these case studies will be of value to you.

FOR EXAMPLE...

COMPLETE HEATING AND VENTILATING FOR A SIX-ACRE TUBE MILL: This case study tells how 37 Dravo *Counterflo* Heaters provide comfort heat in winter, summertime ventilation and fresh, outside air to replace foul air exhausted by ventilators over furnaces. At this modern plant, heat is delivered at the working level and kept there; the Dravo recirculation system keeps roof heat losses low. Heaters are automatic in operation; maintenance costs are low. Get this case study . . . and others on different problems . . . FREE!





DRAVO *Counterflo* HEATER
CASE STUDY REPORT

COPPER TUBE MILL

Speaking of
HIGH ROOF STRUCTURES

User: WOLVERINE TUBE DIVISION, CALUMET AND HECLA CONSOLIDATED COPPER CO., INC.
Location: DECATUR, ALABAMA
Product: COPPER TUBING

Dravo Counterflo Heaters as are at time of case study	NUMBER	FUEL	OUTPUT (Btu)
Main Building	26	PROPANE	1,000,000 each
Main Building	4	PROPANE	2,000,000 each
Carpenter Shop	1	PROPANE	2,000,000
Casting Shop	1	PROPANE	2,000,000
Electrolytic Building	2	PROPANE	2,000,000 each
Engineering Shops	2	PROPANE	1,250,000 each
Boiler Plant	1	PROPANE	1,000,000
Total	37		46,250,000 Btu

Functions of Heaters: Comfort space heating, tempering make-up air and summer ventilating.

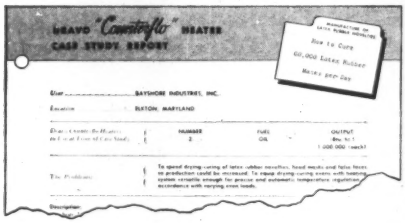
Building Description:
One of the south's largest plants, the main building is 1201 ft. long by 225 ft. wide with a roof height of nearly 40 ft. It has no dividing walls — the floor area installing more than six acres is completely open from one end to the other. Of steel frame construction with corrugated siding and continuous windows 9½ ft. high, the building has six roof monitors, each 1160 ft. long. Carpenter shop adjoins main building and is 160 ft. by 75 ft. Casting shop, adjoining but not partitioned from main building, also is 160 ft. by 75 ft. The Electrolytic Building, a separate structure, is 150 ft. by 160 ft. with an average roof height of 42 ft. Engineering Shops, also in separate building, occupy space 360 ft. by 75 ft. and are 27 ft. high.

Location of Heaters:
In the Main Building, 26 heaters are suspended in an inverted position from building columns along side walls, 13 on each side of the plant spaced about 90 ft. apart. They are arranged to discharge a "crossfire" of warm air above the working area. All the other

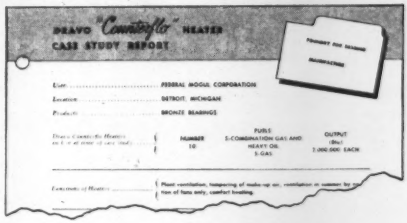
One of the south's largest and most modern plants is this copper tube mill of the Wolverine Tube Division, Calumet and Hecla Consolidated Copper Co., Inc., on the south bank of the Tennessee River near Decatur, Ala.

Case studies are 2 to 4 pages long, standard 8½" x 11" size for easy filing, and punched for 3-ring binder.

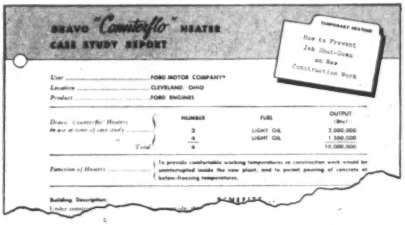
. . VERSATILE DRAVO *Counterflo* HEATERS


DRAVO "Counterflo" HEATER
CASE STUDY REPORT
How to Cure 60,000 Latex Rubber Mattresses per Day
User BAYSHORE INDUSTRIES, INC.
Location ELKTON, MARYLAND

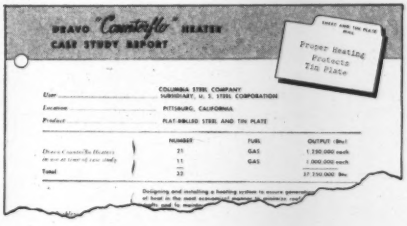
PROCESS DRYING AND HEAT CURING: In industrial production of products such as plastics, wood, rubber, paper, fibers, and ceramics, Dravo Heaters have often increased production due to faster, more efficient drying and curing.



TEMPERING OF MAKE-UP AIR: Where the necessary removal of noxious fumes or harmful dusts from the air makes comfort heating for workers difficult, Dravo Heaters warm replacement air and keep temperatures constant.


DRAVO "Counterflo" HEATER
CASE STUDY REPORT
How to Prevent Job Shut-Downs on Key Construction Work
User FORD MOTOR COMPANY
Location CLEVELAND, OHIO
Product FORD ENGINES

TEMPORARY HEATING: Dravo Heaters provide comfort heating and increase worker-efficiency during building construction and can keep ground temperature above freezing for pouring and setting concrete floors during cold weather.


DRAVO "Counterflo" HEATER
CASE STUDY REPORT
Proper Heating Protects Tin Plate
User COLUMBIA STEEL COMPANY, SUBSIDIARY, U. S. STEEL CORPORATION
Location PITTSBURG, CALIFORNIA
Product FLAT-ROLLED STEEL AND TIN PLATE

COMFORT HEATING LARGE BUILDING AREAS: Garages, diesel repair shops, auditoriums, etc. with large open spaces are heated comfortably and easily . . . Dravo Heaters provide quick, automatically controlled, low-cost heat.

DRAVO HEATERS OFFER YOU:

- **LOW INITIAL COST**—Users report 30% to 60% savings over "wet-type" systems.
- **EASY INSTALLATION**—Need only fuel, exhaust and electrical connections . . . no ductwork.
- **LOW OPERATING COST**—Direct-fired . . . burn gas or oil . . . readily converted . . . minimum efficiency 80%.
- **AUTOMATIC OPERATION**—on-off or modulating controls . . . no constant attention required.
- **LONG SERVICE LIFE, LOW MAINTENANCE**—Stainless steel combustion chamber eliminates refractory lining.
- **SAFETY**—Approved by American Gas Association, listed by Underwriters' Laboratories, Inc.; Dravo standardized safety control circuit accepted by Factory Mutual Engineering Division.
- **MOBILITY**—Can be moved to any location.
- **FLEXIBILITY**—When floor space is limited, can be wall-hung or suspended from trusses in any position.

"CASE STUDIES INVALUABLE," writes a Heating Engineer. "They are informative and highly useful to me."

Send this Coupon Today!

DRAVO
CORPORATION

PITTSBURGH • ATLANTA • BOSTON • CHICAGO • CINCINNATI CLEVELAND • DETROIT • NEW YORK • ST. LOUIS • PHILADELPHIA WASHINGTON

Sales Representatives in Principal Cities

Manufactured and sold in Canada by Marine Industries, Ltd., Sorel, Quebec. Export Associates: Lynch, Wilde & Co., Washington 9, D.C.

DRAVO CORPORATION, HEATING DEPARTMENT
Dravo Building, Fifth and Liberty Avenues
Pittsburgh 22, Pa.

Send me FREE case studies on the subjects I've checked, and Dravo Heater Catalog FG-523-354

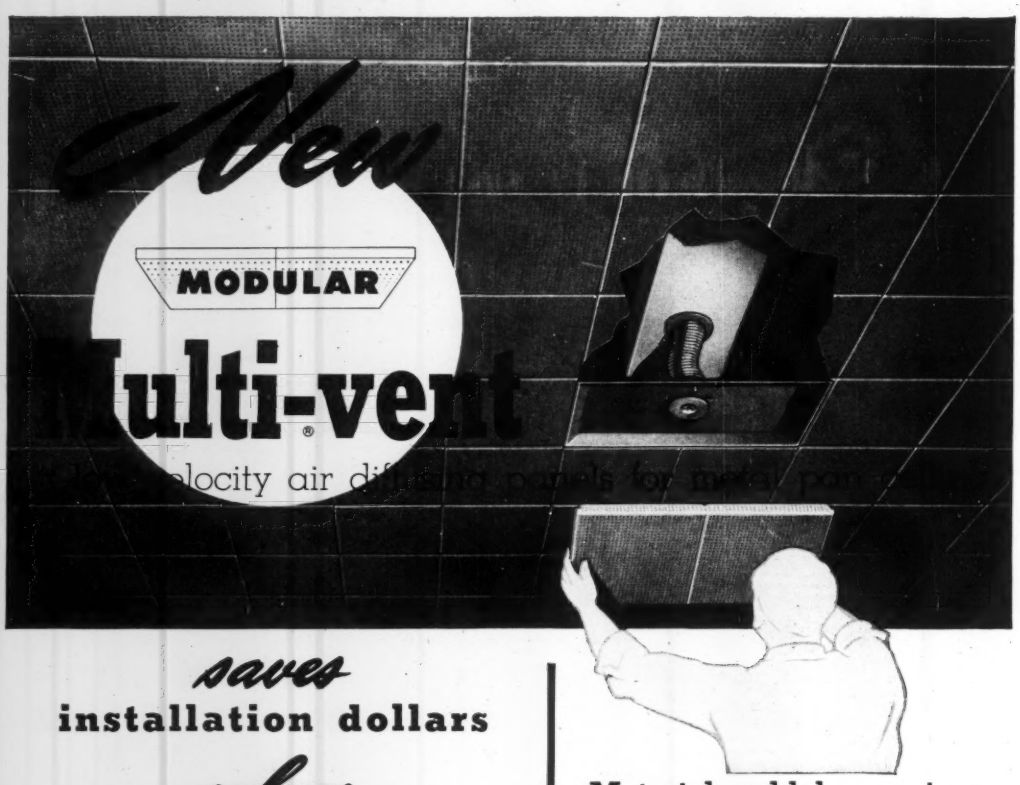
- ☐ Stores, schools and auditoriums.
- ☐ Tempering make-up air.
- ☐ Space heating large buildings.
- ☐ Temporary heating.
- ☐ Process drying and heat curing.
- ☐ Please have a representative call.

Name _____

Company _____ Title _____

Address _____

City _____ Zone _____ State _____



saves
installation dollars

solves
every important air distribution problem

for the *OWNER* • *ARCHITECT* *ENGINEER* • *CONTRACTOR*

- Complete concealment.
- Panel locations determined solely by load considerations.
- Relocation of partitions requires no panel alterations.
- Exceptional uniformity and control of room temperature.
- The highest loads and ventilating requirements handled with a total absence of strong air streams.
- System design, installation, and balancing extremely simple and rapid.

Material and labor saving installation features

1—Shop built duct work installed and system balancing completed prior to and independent of ceiling erection.

2—No additional material, structural work, turndown collars or rigid connections requiring close fitting, sealing or calking are involved.

3—All components of Modular Multi-Vent panels are quickly and easily assembled, attached and aligned in the ceiling by hand without the use of tools. No cutting or reshaping of standard ceiling materials is necessary.

4—Existing air distribution systems can be readily and economically converted to Modular Multi-Vent.

Write for bulletin 385 with complete details and specification data.

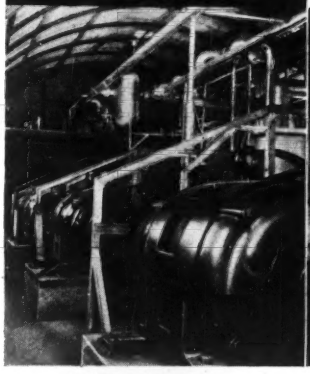
MULTI-VENT DIVISION

THE PYLE-NATIONAL COMPANY
1373 North Kostner Ave., Chicago 51, Ill.

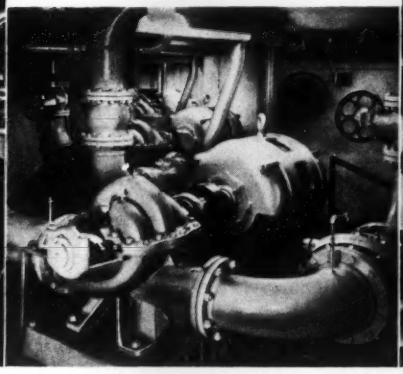
Large or Small...

Century MOTORS

Are Designed to Provide All the Performance That Is Built Into the Machines They Drive



Century 125 H.P. motors driving ammonia compressors for ice for the Falcon Dam, which is under construction on the Rio Grande River.



Century 125 H.P. motors on circulating pumps for condensing units. They serve the refrigeration system of a large department store.

Century 125 H.P. motors on circulating pumps for chilled water. Used in the same department store.

Here are some typical examples of equipment powered by large Century motors, which were application engineered for TOP PERFORMANCE.

Matching the operating characteristics of your equipment is made easy through Century's wide line of single phase, polyphase and direct current motors to choose from. They are made in many types, ranging in size from 1/8 to 400 horsepower, with literally hundreds of specifications adaptable to specific applications.

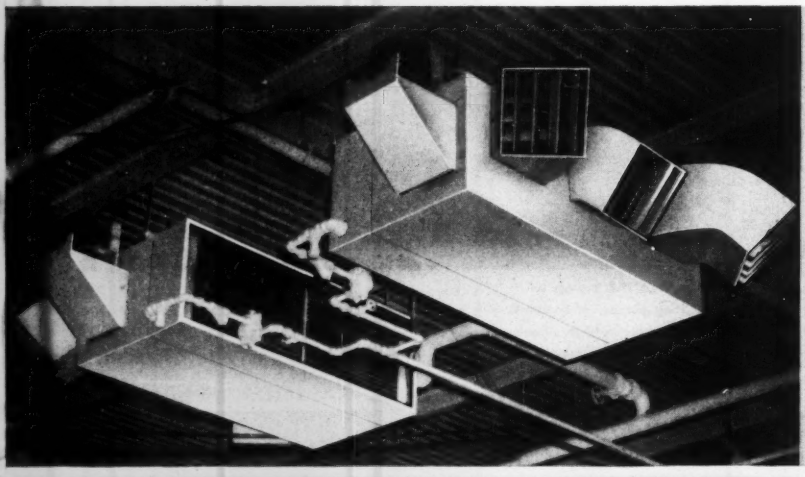
Get Top Performance of your equipment through skillful motor application by specifying Century motors on the equipment you buy and for replacement.

CENTURY ELECTRIC CO.
1806 Pine St., St. Louis 3, Missouri
Offices and Stock-Points in Principal Cities

"Buffalo"

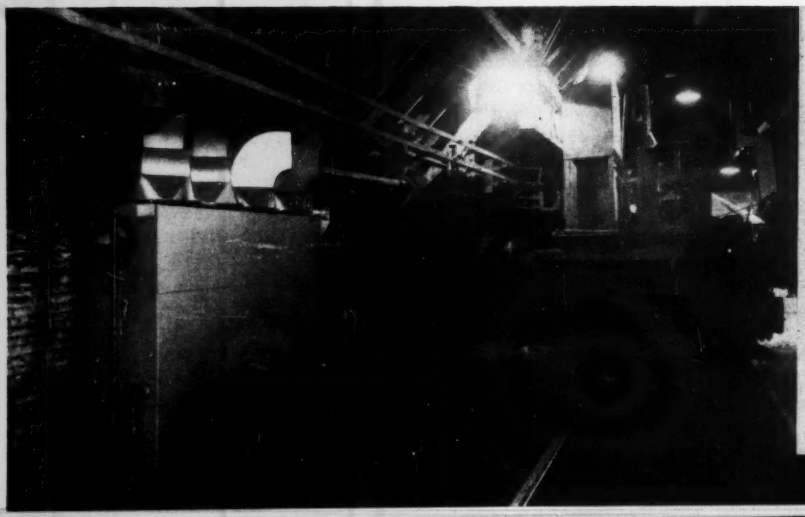
Tips on Better HEATING

Pick the RIGHT Unit—



ABUNDANT HEAT— NO FLOOR SPACE USED

"Buffalo" Lowboy Heaters can be inexpensively mounted overhead to heat entire large production or warehouse areas. Here is a dual installation. Note directional outlets.



LONG, NARROW SPACE-SAVER READY TO THROW QUICK HEAT

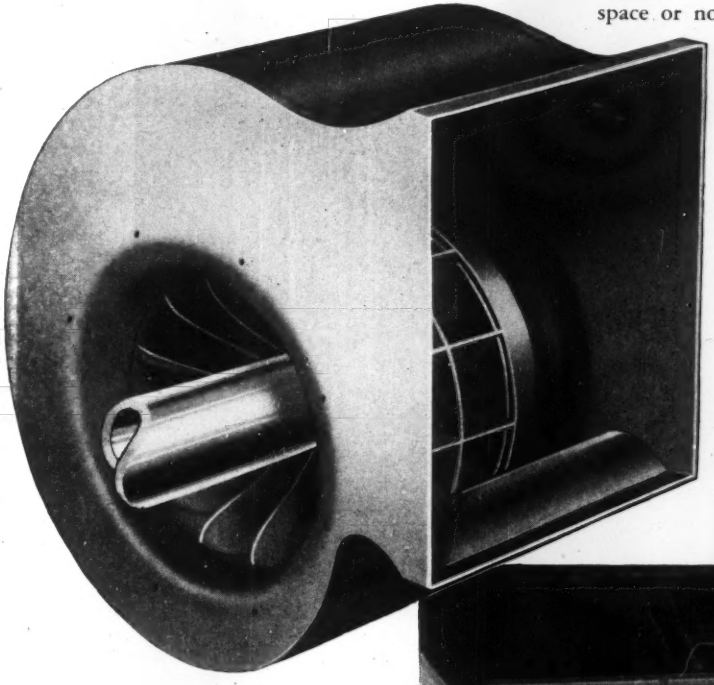
"Buffalo" Highboy Heaters are ideal for wall mounting, as in steel mill and other industrial service. Note bearings recessed in dished bowl for handy outside lubrication.

VENTILATING • PRESSURE BLOWING

NOW!

You can avoid worry, haste and disappointments by solving your heating problems before cold weather comes. You may need just a few small unit heaters, properly placed. You may have an exhaust system, and therefore may require heated make-up air. Or you may have an installation problem, such as cramped space or no available floor space.

The pictures here may answer some of your questions, and for further helpful facts, simply write for Bulletin 3704-A.

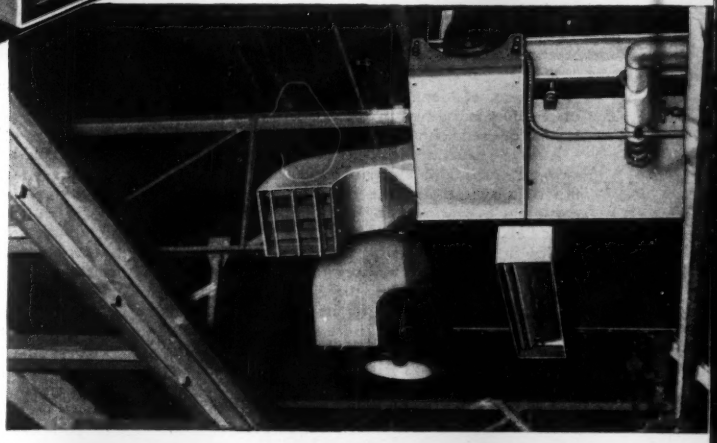


EFFICIENT HEAT DISTRIBUTION

is assured by smooth running "Buffalo" mixed-flow blowers plus non-freeze Aerofin coils.

FRESH AIR PLUS HEAT!

Right, a "Buffalo" Flat Suspended Lowboy with face and by-pass dampers and mixing box for handling fresh and return air. One of many combinations available.



DIAMOND JUBILEE 75TH ANNIVERSARY

BUFFALO FORGE COMPANY

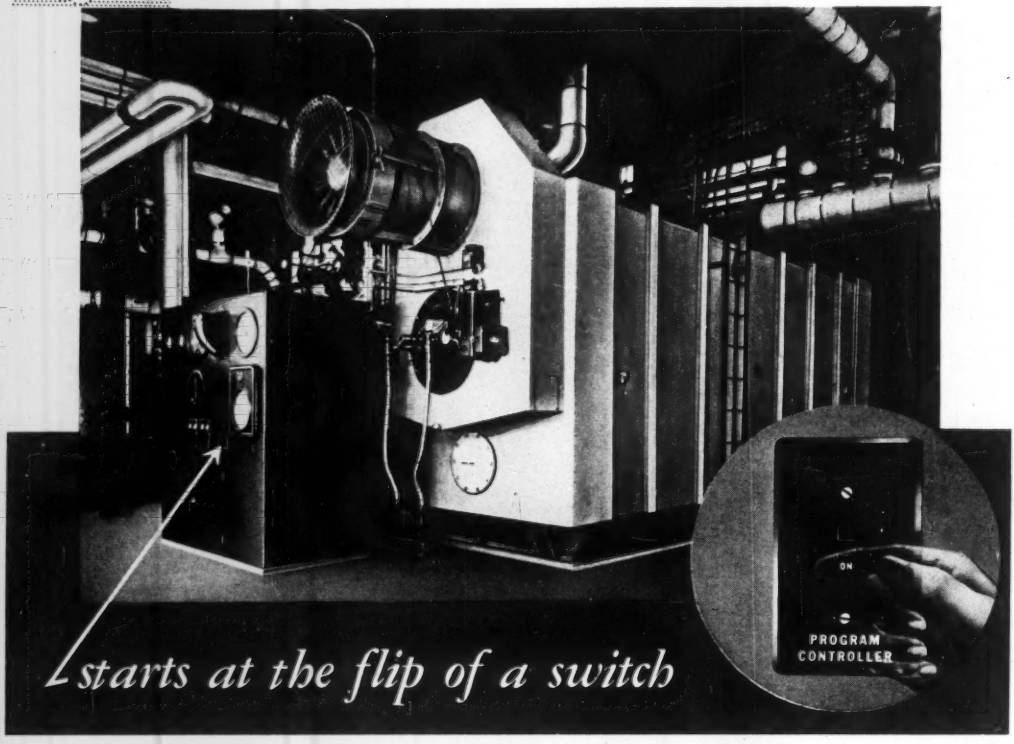
171 MORTIMER STREET — BUFFALO, NEW YORK

PUBLISHERS OF "FAN ENGINEERING HANDBOOK"

Canadian Blower & Forge Co., Ltd., Kitchener, Ont. — Sales Representatives in all Principal Cities

• COOLING • HEATING • FORCED DRAFT • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING

shop-assembled Integral-furnace boiler, type FM



Automatic, efficient boiler operation with complete safety is assured by the positive dual control system offered with the B&W FM Boiler.

After the usual service operations are performed —water, fuel, and electric power turned on—a flip of a switch sets the starting program controller in operation and, in a matter of seconds, your FM Boiler is started.

Not only that! During the start-up, your FM Boiler is protected by sensitive safety devices, available with this unit, that automatically shut down your FM Boiler at the first detection of even slight malfunctioning. These electrical "policemen" act faster than an operator in case anything unusual happens—as it sometimes does with any boiler.

After your FM Boiler is started and is up to pressure, an automatic control not only provides fuel feed as required but also proportions fuel and air for best performance, all under control of safety devices.

When load conditions are so light that your FM Boiler must operate below about 25% of rated capacity—always a troublesome condition—an ON-OFF control is available to smoothly and safely start and stop the boiler automatically on the proper cycle to keep steam pressure within desired limits.

Boiler feedwater also is regulated automatically by a sensitive thermo-hydraulic control system which keeps in step with steam demand.

Full details about shop-assembled FM Boilers with steam capacities of 2900 to 28,000 lb per hr are given in Bulletin G-76. Write for it! *The Babcock & Wilcox Company, Boiler Division, 161 East 42nd St., New York 17, N. Y.*

BABCOCK & WILCOX
BOILER DIVISION

G-566

THE EDITOR'S PAGES

Fellow: Sabin Crocker, of the consulting engineering department of Ebasco Services, Inc. — and a long-time member of HPAC's board of consulting and contributing editors — was awarded the fellow grade of membership in the American Society of Mechanical Engineers, at a meeting of the ASME's metropolitan section in New York. The citation (in part) read:

"[He] spent over 30 years with The Detroit Edison Co., during which time he was responsible for piping design and the development of material specifications. Those of us who have visited the plants of The Detroit Edison Co. are aware of the ease with which a line can be followed in those plants and aware of the fact that piping, and proper space for it, were not afterthoughts. [He] was also responsible for advance planning, including the welding of high pressure piping as long as 20 years ago. For his achievements in piping — its expansion and flexibility, its codes, standards and specifications, its fabrication by welding — and for his research in metallurgy, [he] is awarded the fellow certificate."

Water regulation: According to rules applying to an ordinance regulating the use of water, adopted by the Detroit common council earlier this year, mechanical refrigeration systems used for comfort cooling — and employing city water, not recirculated — "shall be limited to a space temperature of not less than 80 degrees dry bulb when the outside temperature is 90 degrees or above by official U.S. Weather Bureau determinations." This provision does not apply to hospitals or similar institutions, and it doesn't apply on Sundays.

How excited can you get?: How excited do delegates and spectators at a national political convention become during a debate, a rousing speech, or a demonstration for one of the candidates? Carrier Corp. officials learned the answer to that one during the Republican convention. The big centrifugals used to cool the hall responded automatically to any increase in heat energy in the arena by increasing their cooling capacity an equal amount. The increase in cooling was recorded by electrical dials which showed the amount of current used to drive the machines. Biggest increase of the five days of the GOP sessions came during the demonstration for former President Hoover — a rise of just over 100 tons. Other large increases were shown during the demonstrations for Taft and Eisenhower and for MacArthur's keynote speech.

Tremendous effect: "There is no question but that air conditioning had a tremendous effect on our convention," declared Joseph W. Martin, who served as his party's permanent convention chairman for the fourth time, according to officials of Minneapolis-Honeywell Regulator Co. "I have never seen such sustained energy and enthusiasm as that which characterized our meetings for five long days and nights. The heat and humidity we have suffered at past conventions would have prohibited such extended performance," he said.

Contracts awarded: The first six months of 1952 trailed the first six months of 1951's record-breaking volume in construction contracts awarded in the 37 states east of the Rockies by 12 percent. According to F. W. Dodge Corp., construction news and marketing specialists, the total for the first half of '52 was $7,758,578,000. However, discounting $980 million in Atomic Energy Commission project awards included in the first half figures for 1951, the current year was only 1 percent behind last year. Six-month individual 1952 totals compared with six months in 1951 were: Non-residential, $2,698,975,000, down 34 percent; residential, $3,344,037,000, up 1 percent; public and private works and utilities, $1,715,566,000, up 21 percent.

"*Awful August*": Hay fever sufferers — estimated to constitute an "ill-nosed one-fifth of the nation" — have about given up expecting relief through medical or weed-pulling projects during "Awful August," according to John A. Gilbreath, head of the air conditioning division at Servel. One reason the subject of hay fever has become of such nation-wide interest in recent years, he added, is because of the trend toward suburban living. The result has been "an increasing exposure of people to ragweed and a sharp increase in the number of victims." Mr. Gilbreath said that one physician, who is an authority on the subject of hay fever, had summed up medical findings on the subject as follows: "Unfortunately, there is little opportunity for complete escape from grass pollen except by staying indoors with the windows and doors shut." He said that "while this doctor was being ironic, he was actually talking about all-year air conditioning."

Apartment air conditioning: One thing Manhattan House — a full block of luxury New York apartments — doesn't have is central air conditioning, but if the New York Life Insurance Co. were to build another such project, company executives think at least part of it would be centrally conditioned, according to Architectural Forum — The Magazine of Building. The Manhattan House type of tenant wants air conditioning, and many of them will pay for it even when payment is the cost of installing unit conditioners — "a far higher rate than central air conditioning should demand," says the magazine.

Air conditioning of operating suites in hospitals — the advantages and disadvantages — were summarized recently by Roy Hudenburg, secretary of the council on hospital planning and plant operation of the American Hospital Association. His answer to a question on the subject appeared in the publication "Trustee," a journal issued by the AHA and read by members of hospital governing boards in the U.S. and Canada.

Mr. Hudenburg said:

"First, the disadvantages. These lie, as far as I have been able to find out, entirely in the cost involved. The prevailing practice in designing air conditioning for such suites is to exhaust entirely to the atmosphere

the air returning from the operating rooms. This means that the machinery must be designed for an extremely heavy load since there is no recirculation of air. It also means a high operating cost.

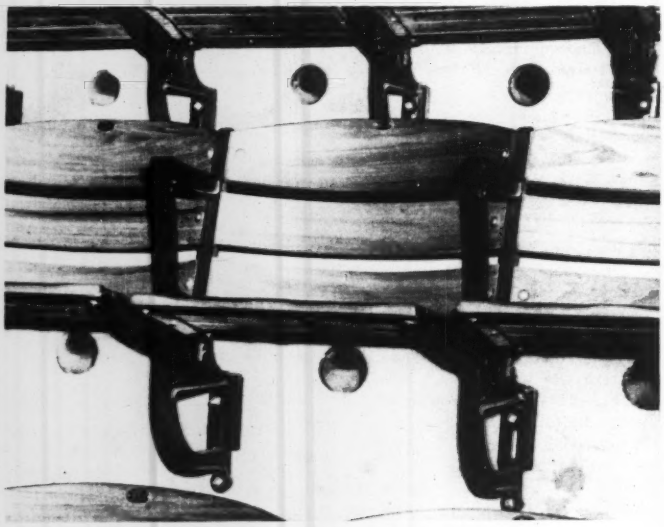
"The thesis that air conditioning in any way increases the hazard of infection in surgical patients, however, has not as yet been proven. On the contrary, there are reports of work done at the University of Chicago that indicate some evidence that a controlled humidity at a level of 55 percent relative humidity actually has some bactericidal effects. The natural direction of air travel over the area of surgery is upward because of the heat of the operating lamp. The slow travel of air due to air conditioning could have little effect on this more local convection.

"On the advantages of air conditioning the operating suite, much can and has been said. First of all, it must be obvious that the surgeon cannot perform at his greatest efficiency in an overheated room, particularly when the light from the surgical illumination is bearing right down on his head. Secondly, there appears to be some feeling that control of the temperature in the operating room prevents some shock to the patient when he is removed to a cooler surrounding area.

"If the air conditioning system provides for controlled humidity and is well maintained so that it is in operation at all times and for several hours before operations begin, the humidification control factor does assist in controlling static. All of the safeguards, including the installation of a conductive floor, conductive fittings on the gas machine and the conductive sheeting required in National Fire Protection Association recommendations, still must be carried out. Of course, they are more effective, usually, under tightly controlled humidity conditions.

"The recommended humidity level for operating rooms is a 55 percent relative humidity. Reports definitely prove that the triethylene glycol aerosol used for bacteria control is much more effective at 55 than at any other relative humidity level. For further information on the subject of bacteria control, you may refer to 'The Disinfection of Air,' an American Hospital Association manual."

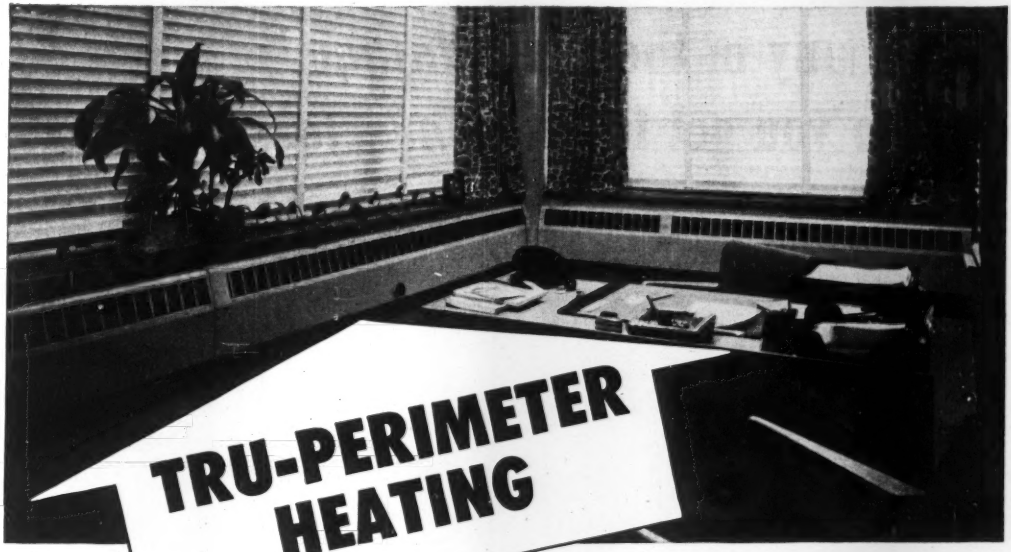
HEATING COLISEUM'S BALCONY



THE AREA BEHIND the balcony seats in the Bexar County coliseum, San Antonio, Texas, is used as a plenum chamber, with sleeve openings through seat risers to direct heated air where it does the most good. The outlet to each seat is a 3 in. pipe sleeve, which was set in the forms before the concrete was poured. Spaced equi-distant around the arena inside the plenum chamber are 16 automatically controlled, gas fired, 650,000 Btu, warm air space heaters. Return air enters duct openings spaced around the perimeter of the building at the top of the balcony tiers, and flows to the heaters where it first passes over economizer tubes heated by stack gases, and then around the stainless steel combustion chamber. Heater fans control the air flow and send part into the plenum chamber and the remainder into a duct system feeding grille openings beneath the balcony, which heat the box seat area. Similar ducts direct heated air to the bandstand over the rodeo entrance. (Photo courtesy Dravo Corp.)

Conservation study: The Building Research Advisory Board has recently published its final report on its study of conservation in building construction, performed under a contract between the Defense Production Administration and the National Academy of Sciences. Among the recommendations of the BRAB's advisory panel on heating, ventilating and air conditioning are that performance guarantees of completed structures and equipment be limited to one year, as "excessive performance guarantees raise the contractor's bid out of proportion to the value received by the owner" and "defective materials and inferior workmanship will usually be manifest within a one year guarantee period." The advisory panel "recognizes ingenuity in design as the most effective and productive of all conservation measures in engineering and architectural practice," urges "greater latitude for responsible engineers to exercise ingenuity and judgment in design."

Pioneer: The Congress hotel, Chicago, has been awarded a bronze plaque by William Bodinus, district manager for Carrier Corp., as "a pioneer user of air conditioning." The citation accompanying the presentation outlined the pioneering efforts of the hotel. The original cooling system was installed in the Congress in 1907, was designed to handle the Pompeiian room, as well as other public areas. In 1911 the system was expanded into a new annex constructed by the hotel, with additional refrigeration to handle cooling for air washing and ventilating apparatus.



Fully air-conditioned Physicians and Surgeons Building, Columbus, Ohio, uses Webster Walvector in perimeter heating to compensate for heat loss from large glass exposure

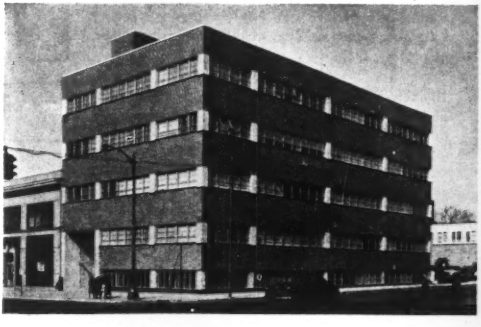
Webster Walvector, installed under the continuous windows and extending only about 3 inches from the wall, spreads the heat from wall to wall in the Physicians and Surgeons Building. A continuous flow of hot water is circulated, heated sufficiently to completely offset the effect of the cold glass, thereby assuring comfort *everywhere*.

Top heating efficiency is assured through the use of sturdy aluminum fins on copper tubing, spaced for maximum effectiveness. Enclosures with integral grilles are sturdily built of amply heavy steel. Heating elements and enclosures are both mounted on a heavy gauge mounting angle, sealed against the wall with a continuous sponge rubber seal preventing any air flow in back of the mounting or enclosure.

The list of advantages of Webster Perimeter Heating with Webster Walvector is a long one.

Complete technical data on Webster Walvector is available in Bulletin B-1551 and the experience of the 60-year old Webster organization is yours to call upon. Get in touch with your Webster Representative or write us.

Physicians and Surgeons Building, Columbus, Ohio. Completed 1951, features Webster Walvector and complete air-conditioning. Architect: Tibbals, Crumley and Musson. Consulting Engineer: Robert S. Curl and Associates. Heating Contractor: The Huffman Wolfe Company.



Address Dept. HP9

WARREN WEBSTER & COMPANY

Camden 5, N. J. Representatives in Principal U. S. Cities

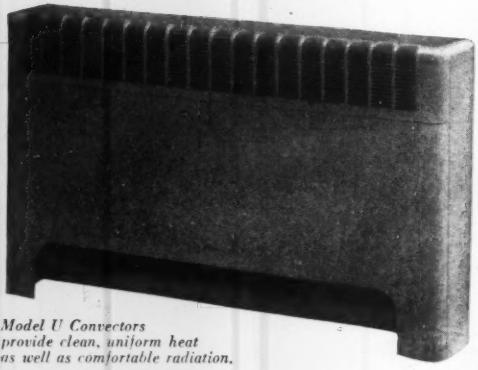
In Canada, Darling Brothers, Limited, Montreal

Webster WALVECTOR

REG. U. S. PAT. OFF.

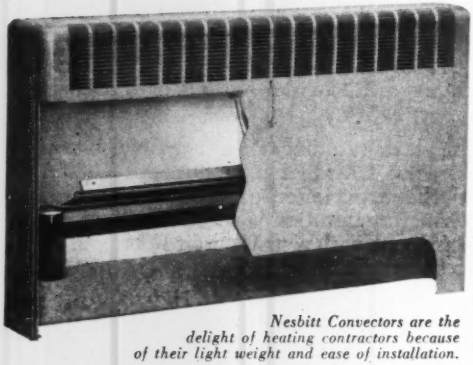
For Steam or Hot Water Heating

How many of these *advantages* do you get in the *convectors* YOU buy?



Model U Convectors provide clean, uniform heat as well as comfortable radiation.

You get all these in NESBITT Model U Convectors



Nesbitt Convectors are the delight of heating contractors because of their light weight and ease of installation.

Scientific design: an *engineered* product resulting from 40 years of Nesbitt *pionairing* in the comfort heating field. ☐

Superior construction: of heavier than customary furniture steel; sturdily reinforced; built up to a reputation, not down to a price. ☐

Artistic styling: conformable to the best décor; rounded edges; functional curved-top grille for added heating capacity. ☐

Pleasing finish: phosphated metal, hardcoated in a neutral prime gray that takes a color coat well, but does not require it. ☐

Universal application: to one or two-pipe hot water systems (forced or gravity), or to two-pipe steam systems. ☐

Optional placement: the one casing may be installed free-standing or semi-recessed, as desired, with front easily removable. ☐

Easy connection: with universal headers tapped for every practicable hookup without removal of element from casing. ☐

Stock sizes: modular lengths in two heights, offering 23 standard sizes—from wholesaler stock—for practically every requirement. ☐

Honest ratings: in generous conformance with Commercial Standard 140-47 and approved by the Convector Rating Committee. ☐

Individual packing: fully assembled in a durable corrugated carton for delivery to the job in mint condition. ☐

Dampers optional: in complete separate packages, with all attachments, for easy installation, originally or later. ☐

Competitive prices: with the savings of large-volume, production-line manufacture passed on to you. ☐

Reliable guarantee: against original defects in material or workmanship, for one year from date of shipment. ☐

Order Convectors *by name:* NESBITT

Sold exclusively through Plumbing and Heating Wholesalers

A product of JOHN J. NESBITT, INC., State Road and Rhawn Street, Philadelphia 36, Penna.

"OPEN FOR DISCUSSION"

We follow here each month the practice at engineering society meetings of providing an "open for discussion" period. You are urged to participate. Address your comments to the Editor, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.

HOW TO AIR CONDITION TELEVISION STUDIOS

J. F. SCHMIDT has written an informative article [in the August HPAC] on the air conditioning of television studios and TV technical spaces.

I note that his indoor design dry bulb conditions are 75 F for summer and 72 F for winter. As many studios are in structures not affected by outdoor conditions, the designer must make sure that he can deliver colder supply air in winter than in summer. Many designers have learned this the hard way, when laying out air conditioning systems for interior spaces in office buildings and industrial plants.

If the indoor design is 72 or 75 deg, I would be liberal in the assumption of my lighting usage factor; then, if more lights were used for not too long periods, the indoor dry bulb could rise a few degrees without any harm being done.

Horizontal air blows under the main lighting level (usually incandescent) are excellent. The thing to watch out for is the return air. I have found that where return intakes are located at or near floor level, in no time at all they are covered up with pieces of scenery or other impedimenta.

I would say that sound control is the most important single factor in design. Next is satisfactory air distribution in small spaces requiring large volumes of air. Sound levels of 20 decibels in some areas are standard and this is not too easy to reach.

I would start off with a forwardly curved blade fan, operating not at its slowest speed but as close as possible to its maximum efficiency point. I would line the ducts with acoustical material. Some linings used for acoustical attenuation have a tendency to flake off and in a few years the ducts are filled with a powdery like substance which gives trouble. Such linings should be avoided.

In radio and television work there is often a space with a low sound level located quite near the fan. The duct run is not long enough for sufficient acoustical lining, so sound cells splitting the duct into two, three or four sections are necessary. Care must be taken to size these cells so that the pressure loss is not above the required level. On one or two television installations, I have used what I call a "merry-go-round" duct, which is a duct running in a circle, or with several bends, to get enough length for sound dampening. A number of elbows are of course excellent for this purpose.

To get air distribution without drafts, where large volumes of air are needed to absorb the heat load, I have found five cone ceiling diffusers and perforated ceiling panels to be excellent. I recall that in one control room, with about 25 air changes, perforated ceiling panels are delivering the air with no draft at all. Such an installation is expensive because the cfm's per valve of the perforated panels must be low and this means a large number of panels are required for a given area. But the method gives very satisfactory results.

I do not think split systems in control rooms are very practical. I recommend space air for absorbing the heat loss of the equipment. I have never found enough space in or around such rooms to run another air system.

The auxiliary TV equipment placed in racks in transmitter rooms and similar places, is, as Mr. Schmidt says, a problem. In such spaces the racks usually form narrow aisles, maybe four or five to a room. It is almost impossible to do a very smooth job of air distribution here. I have used plaques, with blankoffs, ceiling grilles discharging downward, and similar devices for such spaces. It must be remembered that air should pass through most of these racks in order to do an effective job. This makes the location of exhaust or return grilles rather important.

In one installation, I have supply outlets running down one aisle and exhaust intakes in the next one, alternating through the room.

In connection with the selection of acoustical lining for sound attenuation in duct work, it has been my experience that there seems to be little definite information on its effectiveness, especially for varying sound frequencies. In various studios on which I have worked, I feel reasonably sure that I could have gotten along with less duct lining, but having no information I could rely on, I felt compelled to use a high safety factor.—F. F. STEVENSON, Graham, Anderson, Probst & White, Architects-Engineers.

MANY OPPORTUNITIES TO SAVE WASTE HEAT

I HAVE READ with much interest Samuel R. Lewis' discussion — in the August HPAC — of the subject of converting heating to low pressure steam. Evidently Mr. Lewis is an "old-timer", like myself, as I can well recall the period of which he speaks.

I very well remember my own experiences with the 100 to 125 lb steam boilers of that era and the reciprocating engines, as well as the use of exhaust steam from them for space heating and water heating in many industrial operations.

In that day, industrial plants often wasted great "oceans of heat" in the form of exhaust steam which was dumped overboard without regard to the economies possible in its recovery. Of course, the low price of fuel then consumed in these plants may have delayed the recovery of wasted energy from engine exhaust and hot condensate.

Mr. Lewis speaks of the still unrealized thermal gains that are possible from the recovery of waste heat and I am sure that he has discovered many situations today where plants are dumping energy overboard. His discussion of the methods employed by engineers in the early days to take advantage of this economical way of heating is very interesting. They were able then to recover wasted energy from heat depositories on

temperature planes of 212 deg or thereabouts.

I have just completed a survey of a large food processing plant suffering from overloaded boilers and excessive pressure loss in its steam distributing system. The facts developed were most illuminating but the story is too long for recording here. [Note: An article in a future issue will give further details.] However, it can be said that the preventable fuel and steam waste was found to be appalling and — what made it more incredible to me — the annual fuel bill exceeded $85,000.

This case is by no means an isolated one and it should serve to illustrate the fact that, while we may be living in the atomic age, such engineering problems as the recovery of waste heat have a long way to go before we can say that they are at least in pace with the times. This is particularly true when considered from the standpoint of the innumerable efficient facilities that have long been available for all types and sizes of industrial steam plants.

Mr. Lewis has presented an interesting and instructive picture of the transition in methods from those of yesteryear to today in the field of steam and electricity.—C. T. Baker, Consulting Engineer.

WE KNEW "MOTHBALL FLEET" WOULD PAY

Referring to the article entitled The "Mothball Fleet" Pays Off, by Albert S. Gates, Jr., the first part of which was published in the July HPAC, to those men who were first associated with the idea of preserving ships and their component material, there was never a question of "would it pay off". There was only the question of "when". Among the assigned technical functions of the Air Conditioning Section of the Bureau of Ships, U. S. Navy, even prior to 1941, was the "preservation of a fleet which we did not have after a war which we were not yet in."

The philosophy of cleaning and putting away one's tools for tomorrow's work, and for many tomorrows, is not new. It is a habit of any good workman. Obsolescence and accidental destruction are minor factors when compared with the inexorable forces of nature in reclaiming all matter. Iron and steel, of which most tools are fabricated and of which ships are built, are more susceptible to rapid deterioration through the forces of moisture and temperature than any of the other natural forces combined. Deterioration of the many vessels and material from World War I was neither vivid nor very impressive except to the few who had contact with them. Perhaps they represented too much of an indictment of the public housekeeping to be kept in the public eye — much like dust accumulating under a bed. Yet, here was a waste of American economic wealth.

The aim of post-World-War-II preservation practices was not 100 percent perfection, but rather to save the most for the least expenditure of time and money. The last 10 to 20 percent is generally the most expensive and is sometimes unattainable.

Mr. Gates is to be commended for his diligence and extensive research in providing the facts and figures which substantiate the fact that preservation has "paid off", and from which valuable conclusions may be drawn toward an extension of preservation to more of both industrial and public material.

A significant conclusion may be drawn from the fact that the planning of this large preservation program was accomplished by a relatively few men, many of whom did not "count points" until "the show was on the road", and that, in a phrase ascribed to Charles Kettering: "Wouldn't it have been more remarkable if a large committee had done it?"—Thomas H. Urdahl, Consulting Engineer. Formerly, officer-in-charge, Air Conditioning Section, Shipbuilding Division, Bureau of Ships, Navy Dept.

PLAN COOLING TOWER SILENCING DURING DESIGN

Martin Hirschorn's article on silencing cooling towers, in the August HPAC, covers a number of the important aspects of cooling tower sound control design and this writer concurs with many of the points brought up in this article. It is encouraging to see Mr. Hirschorn emphasize the planning of cooling tower silencing at the time the tower is being initially designed. This is indeed a means of obtaining the most economical noise control treatment.

If the tower is treated before it has been run, objections from surrounding neighborhoods which might otherwise arise are not brought forth, thus creating a most advantageous public relations position.

It is often very difficult to have an anti-injunction order rescinded after such court action has been taken, resulting from the complaints to cooling tower noise.

In designing a silencing system for cooling towers not yet erected, it is often necessary to predict an initial acoustical spectrum fairly accurately. This prediction can be made from a number of complex variables, as outlined in Mr. Hirschorn's article and further detailed in my own article, entitled How Cooling Tower Noise Has Been Reduced, which appeared in the April 1951 HPAC.

I believe Mr. Hirschorn's article will further aid in impressing cooling tower people with the importance of acoustic considerations in initial cooling tower design.—Richard D. Lemmerman, Vice President, Industrial Sound Control, Inc.

CALIBRATION OF DRAFT CONTROLS

The comments on calibration of draft controls, in the August HPAC, are very interesting to us.

I believe the author is correct in pointing out that the draft rate where the barometric draft control is installed is relative to the draft rate over the fire but never the same. Also, the relationship is a variable on every installation; therefore, calibration would serve no purpose.

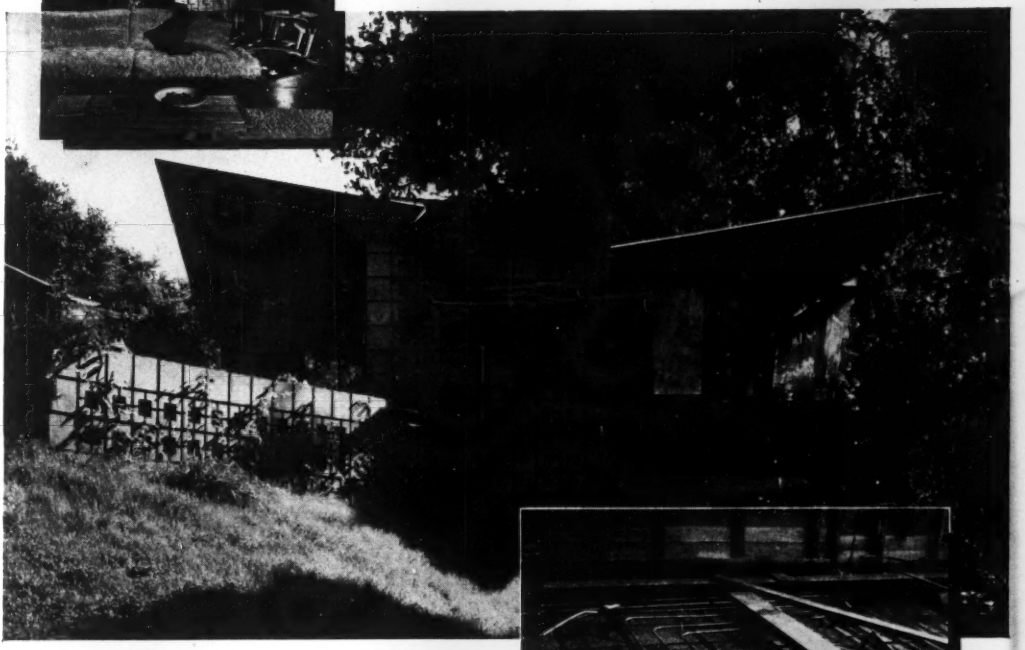
Perhaps just a scale with numbers or letters would serve a better purpose. Once the installer arrived at the proper setting with CO_2 instruments, he could recommend that the draft control at all times be adjusted to the proper location.

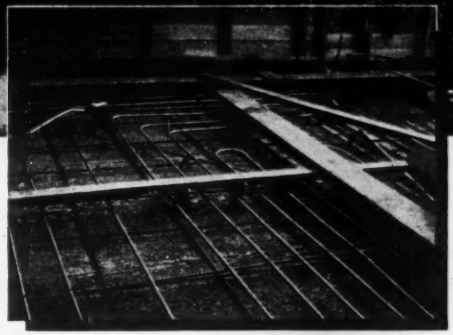
As manufacturers of automatic, electrical draft controls, we of course always point out that draft is to be controlled over the fire. Since our type of equipment operates from a draft sample actually in the firebox, a calibration on our instrument would be practical on any installation. Also, our type of equipment is not affected by variations in boiler design or by sooting of flues or changes in firing rate. We realize of course that cost prohibits use of such automatic equipment on small jobs.—N. F. Hahn, Cleveland Fuel Equipment Co.

MIDGLEN HOUSE

REDWOOD CITY, CALIFORNIA

Designed by Cappuccilli, O'Hare, Patrick and Wisniewski
Photos by Morley Baer





ANOTHER CASE OF *Copper* WHERE IT COUNTS

Built for gracious living and to take full advantage of its natural setting, the Midglen House is the last word in contemporary architectural design. Yet, new and modern as the design is, in two of the spots calling for the utmost dependability of materials, the oldest metal probably known to man, is employed . . . COPPER. Revere Copper Water Tube is used for radiant panel heating and hot and cold water lines. Midglen House was conceived and built by Cappuccilli, O'Hare, Patrick and Wisniewski. Redwood Plumbing Company, Inc., was the plumbing and heating contractor.

While present conditions may preclude the use of Revere Copper Water Tube for radiant panel heating, designers, architects, builders and contractors are using what tube they can get where it counts most. They have found, by experience, that it pays dividends in prestige, reputation and customer satisfaction.

See your Revere Distributor. He will advise you of the availability of materials and, in the event you wish to discuss your technical problems, put you in touch with Revere's Technical Advisory Service.

(Top inset)—SECTION OF THE CANTILEVERED living room at Midglen House. Radiant panel heating coils are embedded in integrally colored concrete floors.

(Bottom inset)—HERE YOU SEE the Revere Copper Water Tube fastened to the steel reinforcing, which was laid over 6" of gravel, preparatory to the pouring of the concrete. 1,700' of non-rusting Revere Copper Water Tube was used for radiant panel heating and water lines in sizes ranging from ½" to 1". When Revere Copper Water Tube is used the solder or compression fittings employed make it possible to use a thinner wall tube than is the case when threaded fittings are used, with a substantial saving in metal. Contractors prefer it because when 60' coils are used bending can be done by hand and fewer fittings are required, making installation easier and faster.

REVERE

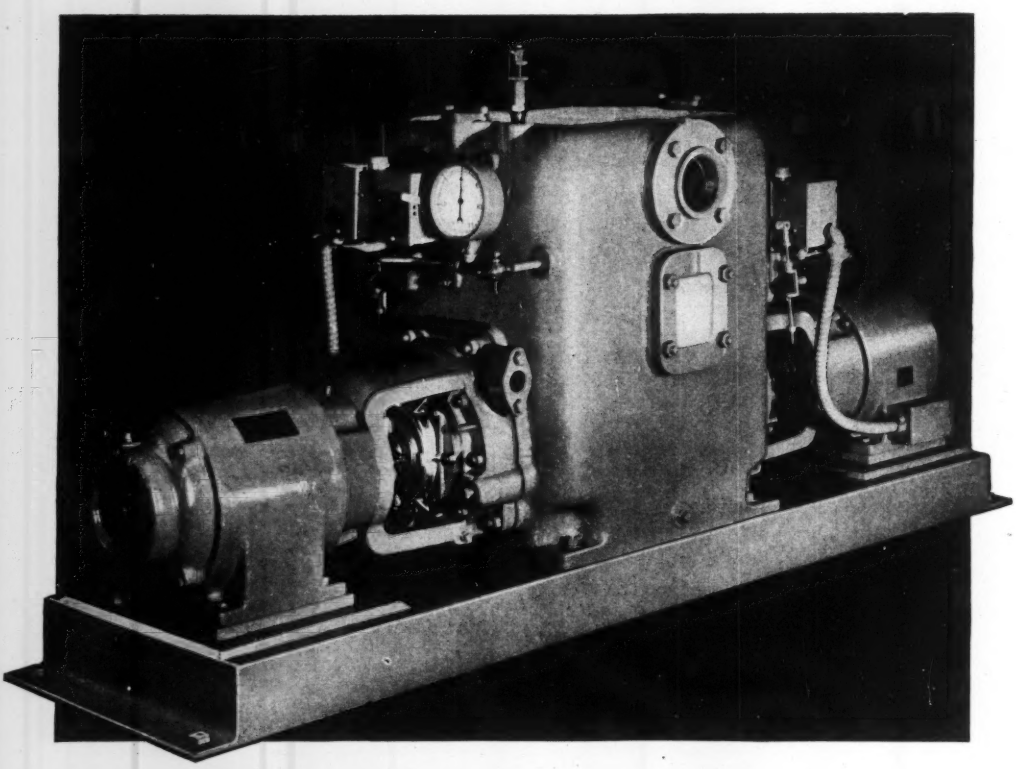
COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801
230 Park Avenue, New York 17, N. Y.

• • •

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.—Sales Offices in Principal Cities, Distributors Everywhere

SEE REVERE'S "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY



THE HEATING PUMP WITH CERTIFIED PERFORMANCE

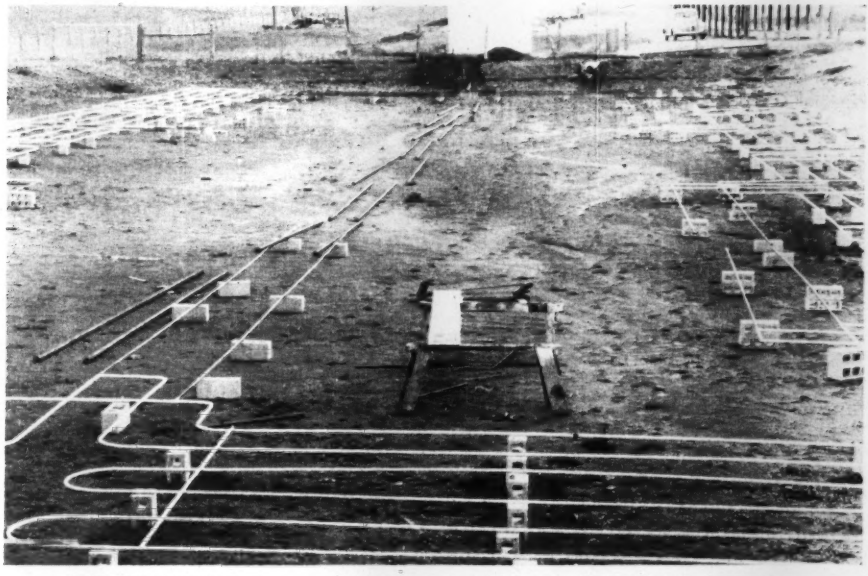
A Jennings Return Line Vacuum Heating Pump may be installed with the absolute assurance that it is of the proper capacity to keep your heating system at top-notch efficiency.

For the actual working capacity of your Jennings Pump is determined by careful tests under working conditions, and with the actual motor that goes on your job, regardless of current characteristics. Every Jennings Pump has to deliver full rated capacity of air and water simultaneously before it is released.

The Jennings Heating Pump has everything in the way of safety, convenience, and real dollar saving economy that years of experience as leading heating pump manufacturers have enabled us to put into it. Quality is backed by an unchallenged reputation, and satisfactory performance is assured by a nation-wide network of Sales and Service offices.

THE NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.



THE POND HEATING system under construction, with the small building at the far end housing the boiler. The grids, of ¾ in. galvanized pipe, are approximately 11 by 50 ft

Texans Heat a Lake To Hatch Black Bass

Pipe grids set on concrete blocks above the pond bottom are supplied with hot water from a small boiler to keep the pond at a minimum of 72 deg. Townsend Miller describes the installation and its advantages

WHEN THE TEXAS Game and Fish Commission decided to see if black bass could be hatched in midwinter, the heating industry was called upon to provide warm springtime conditions in an outdoor lake — even during freezing weather.

The pond — now in operation at the commission's San Marcos hatchery — is believed to be the first lake-type body of water with a dirt bottom ever heated artificially and the first outdoor heated pool requiring such critical tolerances of temperature control. The pond is generally rectangular in shape, with a surface area of about 0.58 acres. It contains 1.62 acre feet of water, averaging just under 3 ft in depth and having a maximum depth of around 6 ft.

Large-mouth black bass usually begin laying their eggs in the spring when the water rises to a temperature of between 65 and 70 F. Sharp fluctuations destroy spawn and young and interrupt spawning activities. The requirements, then, were that the heating system keep the water at a minimum of 72 deg, with safeguards against overheating.

Aids Bass in Battle With Non-Game Fish

The pond is being used in a radically new experiment in the production of young fish for restocking purposes. The idea was originated by H. D. Dodgen, executive secretary of the Texas Game and Fish Commission, and is designed to give black bass a "lift" in their battle

against overcrowding by non-game fish such as carp, gar and gizzard shad.

The theory is that if the young bass can be hatched in midwinter, long before the natural hatching time of the competing species, the young bass, when placed in a lake or stream, will be large enough to feed on the young of the later-hatched competitors. This not only would give the young bass a wealth of food to stimulate rapid growth, but also would provide a method of reducing the populations of unwanted species.

Pipe Grids Set Above Pond's Bottom

Basically, the heating system is composed of a hot water boiler from which heated water is pumped through a series of pipes laid under the surface of the pond.

The ¾ in. galvanized pipe carrying the hot water through the pond is bent and welded into grids of approximately 11 by 50 ft. The pipe in each grid is laid parallel, spaced 2 ft apart, and is reinforced with lightweight "L" beams laid at right angles to the pipe. Ten of these grids are patterned around the edges of the pond, four on each side and one at each end. They are set on concrete blocks 18 in. above the pond's bottom.

Approximately 3650 lineal feet of pipe was installed in the pond, including the headers.

Hot water is fed from the boiler into all the grids through a 3 in. main, and another 3 in. line handles the return flow.

The heated water is supplied by a cast iron sectional boiler with an output of 1,352,000 Btu per hr, fueled with natural gas. The pump is 1½ hp with a capacity of 70 gpm.

How the System Is Controlled

The primary control for the water flowing from the boiler to the grids is a three-way motorized modulating valve, controlled by a thermostat reacting to the temperature of the pond water. Cool water returning from the grids is mixed with the hot water from the boiler in the ratio necessary to keep the pond at 72 deg. An auxiliary switch cuts the pump off entirely when no flow is required.

Attached at the outlet of the boiler is a double-bulb outdoor reset control, which reacts to the outside air temperature and the temperature of the boiler water and serves as a fuel cutoff. To assure adequate heating, the gas burns in ratio to the difference in the two temperatures. A high limit safety control inside the boiler prevents the water from exceeding 140 degrees under all circumstances.

One of the main purposes of the outdoor-indoor controller is as an anticipator for sudden cold spells, generally termed "northers" in Texas, which bring the temperature down very rapidly. The purpose of the anticipator is to bring the water temperature up in an effort to get a jump on the outside temperature drop.

The limiting water temperature of 140 deg is based on the assumption that the bass might possibly be injured through contact with higher temperature surface. By experience this did not prove to be very much of a hazard even with high circulating water temperatures.

Manually operated valves controlling the flow into each grid make it possible to stabilize minor localized temperature variations throughout the pond.

Water temperature throughout the pond appeared to be uniform from top to bottom and at all points despite the perimeter location of coils. As a matter of fact, during periods of high winds, the heat loss remained constant from top to bottom, although it had been anticipated that the water at the bottom of the pond would not respond as quickly to surface losses as would the top of the pond.

Windbreakers of corrugated iron recently have been added. They will serve as an angled wall to deflect the wind over the pond, reducing loss of heat due to air flow over the pond surface. These were not in use during original trials last winter.

Advantages of the Heated Pond Many

The pond and its heating system passed those original trials with flying colors. Brood bass placed there hatched young fish within 17 days, and these survived a period of freezing weather which killed 75 percent of the fish in a federal hatchery only a few miles away.

Marion Toole, chief of the commission's inland fisheries division, believes the heated pond will pay for itself, even aside from the benefits of hatching bass in midwinter. Each spring, even during normal spawning periods, radical temperature changes cause considerable loss of spawn and young fish. The financial cost is heavy. The loss of these young fish also makes it necessary to carry extra quotas of parent brood bass, which must be fed and cared for throughout the year.

Use of the heated pond to insure uniform pond temperatures on through the spring spawning period will eliminate these costly losses of young fish and reduce the number and maintenance cost of brood fish.

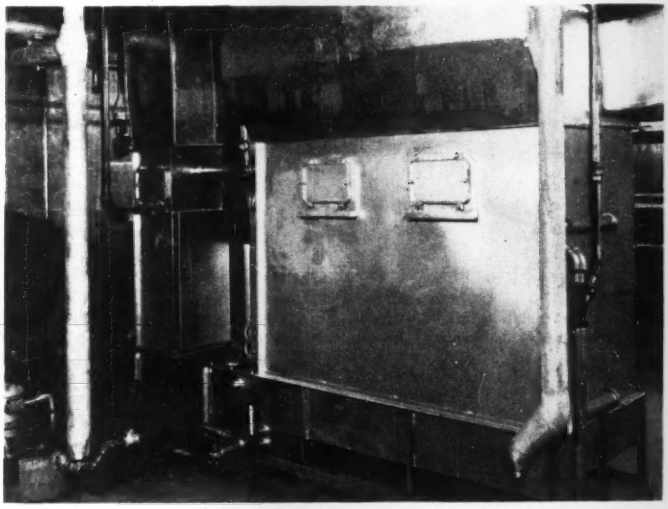
Plans for the coming winter are to begin hatching in late January. Brood fish will be rotated through the pond, providing a steady supply of young winter-hatched bass.

If the unique experiment continues to live up to the successes obtained in the preliminary trials last winter, other hatchery ponds may be similarly equipped with heating systems. Hatchery technicians have reason to believe continued successes might well revolutionize production methods on a wide basis.

Frank Frazee, an engineer with the Calcasieu Lumber Co. of Austin and an ardent bass fisherman, was called upon to solve the engineering problems involved and to draw up plans and specifications. The installation was by Climate, Inc., also of Austin. Don Schuett engineered the job, and Walter Kieke supervised the installation.

HEAT PUMPS GO TO SCHOOL

HEAT PUMPS are to be used in school buildings at Largo, Tarpon Springs, Clearwater and St. Petersburg, Fla. These buildings are constructed with wings containing the classrooms and each wing of the building will have its own individual heat pump system, using well water as the heat source and distributing the heat by means of radiant heating coils imbedded in the floors to each of the individual thermostatically controlled classrooms, according to Acme Industries, Inc. The same heat pumps will supply chilled water in the summer, as well as hot water in the winter, to air handling units supplying year-around air conditioning in rooms where required, such as gymatoriums, cafetoriums, and some classrooms. Philip F. Kennard is the architect.



THE HUMIDITY CONDITIONER is installed in the basement of the Portland Cement Association research and development laboratory. The air washer chamber is to the right, and the absorbing solution regenerator is to the left

Testing Concrete Block Under Low Humidities

How humidity conditioning equipment is used at Portland Cement Association's new laboratory to test curing of concrete block

By George V. Zintel

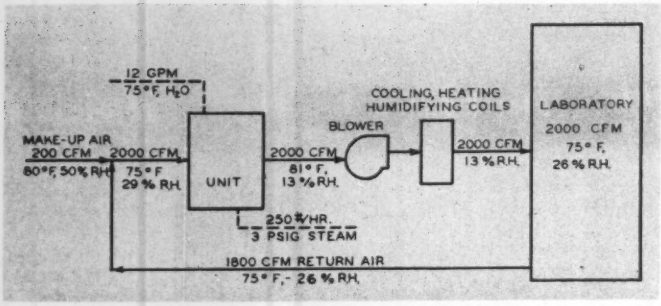
To SIMULATE THE extremes of climate where concrete structures are located, it was necessary to produce — among other things — low humidities in the Portland Cement Association's new $3 million research and development laboratory at Skokie, Ill. (just north of Chicago). This was particularly necessary in connection with the test program on curing of concrete block. In one laboratory room, standard concrete block specimens are tested under conditions varying from 25 to 80 percent relative humidity at a constant room temperature of 75 F.

Plans have just been completed to add facilities permitting tests to be extended to include relative humidity control down to approximately 10 percent.

A chemical absorbent type of humidity conditioning unit is used to create laboratory room atmospheres of 25 to 45 percent relative humidity for as long a period of time as required.

Prior to utilization of this humidity conditioning system, the PCA engineers had control of relative humidities of 50 percent and higher only, obtained principally with a small humidifier for adding moisture to the air in the room. For small air volume dehumidifying to produce low humidities, the laboratory was equipped with a hygroscopic material for moisture absorption purposes. However, it was quickly determined that this type of operation was inaccurate and inadequate for the purpose intended.

Mr. Zintel is Engineer, Zintel, Byfield & Co., Air Conditioning Sales Representatives, Surface Combustion Corp.



FLOW DIAGRAM of the air conditioning system under one of the many possible selective conditions available with this chemical absorbent-type equipment

DURING CONCRETE BLOCK curing tests, engineers observe expansion or contraction and change in weight of standard specimens due to moisture absorption or removal. Many of these specimens are cured and tested at one time under identical temperature and humidity conditions, are stored on racks and individually identified

It was decided to install a humidity conditioning system engineered to fit the association's needs. The humidity conditioner used is shown in one of the photos.

Two thousand cfm of air to be dehumidified is drawn through the air washer chamber of the humidity conditioner. Only 200 cfm is make-up air, at conditions of 80 F and 50 percent relative humidity.

Economical Use of Recirculated Air

The remainder of air to be treated is that recirculated from the laboratory room, 1800 cfm. This results in economical operation, as this recirculated air always is more nearly at the delivered temperature and humidity conditions than is the make-up air. Therefore, less dehumidifying is necessary than if a larger percentage of outdoor air were used. The total air circulated (2000 cfm) was selected to keep air motion in the room at as low a velocity as possible to avoid subjecting the test specimens to a continuous draft.

Operation of Humidity Conditioning System

The total 2000 cfm of air is passed through a spray of lithium chloride-base absorbent solution, while at the same time passing over cooling coils. The moisture removal capacity of this solution increases as the temperature of the cooling medium in these coils is decreased and/or the rate of flow of the cooling medium is increased. This cooling is accomplished at the PCA laboratories with 75 F city water. In those instances where even lower humidities are required, chilled water is used to accomplish the desired cooling.

The temperature and humidity condition of the return air is dependent upon the conditions maintained in the laboratory room. Too, the rate of flow of cooling water depends upon the conditions to be maintained. However, for purposes of illustration, the accompanying sketch depicts operation of the air conditioning system under one of the many possible selective conditions available.

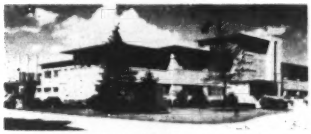
It indicates the laboratory room being maintained at 75 F and 26 percent, with the return air at the identical condition. A humidity reduction of the air through the unit is effected from an entering relative humidity of 29 percent to one leaving of 13 percent.

This dehumidified air is then passed over refrigeration cooling coils to reduce the air temperature to that compatible with maintaining the laboratory room conditions — in this example approximately 10 to 15 F cooling. Here again the amount of cooling is dependent upon those room conditions desired.

Continuous and Automatic Operation

The entire system, once it is set into operation to deliver the required air conditions, is continuous and automatic. The moisture laden absorbing solution flowing from the air washer chamber is reactivated in the regenerator chamber. Here, the absorbent passes over low pressure steam pipes, where the excess moisture is vaporized and then exhausted by a scavenger air stream. The solution is returned at full strength to the air washer chamber for another dehumidifying pass.

Aside from the small amount of cooling water and low pressure steam, the only other utility required for the dehumidifier is electricity for the small pump and fan motors. This particular unit is of the package



PORTLAND CEMENT Association's new research and development laboratory is believed to be the most completely equipped of its kind in the world

type, in that the air washer and regenerator chambers are combined on one base.

Immediately following the chemical type dehumidifier in the air conditioning line is an additional small unit available for aftercooling — and after-heating and humidifying, if necessary, during winter operation or for high temperature-high humidity laboratory room conditioning.

The Concrete Structure Test Program

In durability tests, specimens are subjected to moist heat, dry heat and severe cold; to alternate cycles of freezing and thawing; and to cycles of heating and drying, cooling and soaking, such as occur when rain falls on pavements or other structures that have been exposed to a broiling sun. Continuing studies relating to placing and curing of concrete are of vital importance in determining performance under different exposure conditions.

Concrete Block Curing Tests

In the humidity conditioned laboratory room, tests are conducted relative to the moisture-volume change characteristics of concrete block. Specimens of four different aggregate types, three light weight and one heavy weight, are observed — at times over a period of weeks, and on other occasions over a period of months. Each test is run under specified temperature and humidity conditions which are varied for different test runs.

During the period of a test run, the specimens are tested for expansion and contraction due to moisture absorption or removal. A strain gage is utilized for this purpose, measuring the distance between two brass spuds cemented into the block at predetermined points before the test run begins.

A second check for moisture absorption or removal is accomplished by weighing the specimens during the test run on a precision scale. Usually, observations of this type are carried out over a period of six months.

These test runs may be of shorter duration, depending upon the information required, its purpose, and the room conditions to which the specimens are exposed. Actually, this laboratory room is one of many purposes, and is used to test structural concrete — even entire walls — and its uses under simulated conditions.

The Portland Cement Association laboratory is believed to be the largest and most completely equipped in the world devoted exclusively to research on cement and concrete. The 30 specialized laboratories in these buildings contain more than two acres of floor space.

Atomic Heating Plant's Heat Exchanger Designed for 7 Million Btu Output

[Full details of the atomic heating system at Harwell, England — first reported in HPAC's January 1952 issue — are not yet available, but our correspondent in London has obtained this description and photo of the heat exchanger employed.]

THE GAS-TO-WATER heat exchanger at Harwell is a secondary surface type. It comprises a substantial stack of 3/4 in. diameter tubes wound with a copper ribbon, intimately bonded at each end with tube plates which are separated by the fabricated sides of the unit. The sides are of welded steel construction.

The tubes are supported by two transverse webs, and ferrules are secured to the tubes where they pass through the webs. The webs, in turn, are supported by a system of tie bars. The bars and ferrules can be seen in the photograph, indicating the location of the webs.

Water boxes, cast with suitable dividing baffles to direct the water flow, are bolted to the stack at the top and bottom. Both water boxes are protected internally by a sprayed coating of copper. The water inlet and outlet connections are made to the top box.

Air temperature at the heat exchanger in the present installation is 135 F. Higher temperatures are envisaged as the system is further developed, and — to accommodate these — provision is made for thermal expansion of the entire stack by a floating connection between the lower tube plate and the side pillars of the assembly.

The assembled heat exchanger weighs 8 tons. Its maximum designed output is 7 million Btu per hr.

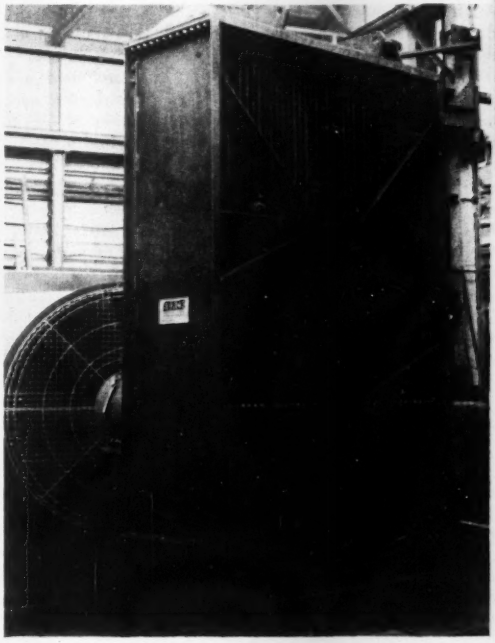


Photo courtesy Serck Radiators, Ltd.

Do Radioactive Wastes Contaminate Drain Piping?

Drain lines can be contaminated by radioactive wastes (such as iodine 131, strontium 89, and phosphorus 32), according to tests made at The Johns Hopkins University. The investigation also indicates precautions to be observed

By Albert P. Talboys
The Johns Hopkins University

HOSPITALS, RESEARCH laboratories, industrial plants and other users of radioisotopes can generally dispose of their low-level radioactive wastes most conveniently by pouring them down the drain. In fact, the National Bureau of Standards has recently published a handbook recommending procedures to be followed in disposing of phosphorus-32 (P^{32}) and iodine-131 (I^{131}) wastes [Reference No. 1]. Dilution by relatively large volumes of sewage flowing through the mains is relied upon to reduce the concentrations of radioactivity to innocuous levels.

However, there is a question as to how much radioactivity is likely to be retained in the drain system between the point of discharge and the sewer. If this waste line piping should become highly contaminated, it is possible that personnel working for long periods in close proximity to the piping could be exposed to excessive levels of radiation, or that those performing maintenance work on the system could actually contact radioactive deposits in the line.

Several Reports of Contaminated Piping

There have been a number of reports of contaminated drain piping during the past several years. In July 1949, pipes at a government laboratory in Chicago were monitored and radiation intensities were found to be well above permissible limits [Reference No. 2]. W. B. Lewis stated that piping at the University of Montreal at one time became so highly contaminated that sinks and drains had to be torn out and replaced [Reference No. 3]. A survey of waste piping in a number of hospitals and research laboratories in the east in 1949 by D. W. Moeller showed that active deposits were present in many lines, although none proved to be of a hazardous level [Reference No. 4]. F. A. Butrico found evidences of detention of radioactive wastes in the drain system of the Massachusetts General Hospital in a 1950 survey [Reference No. 5]. A later field study in the Baltimore-Washington area disclosed two instances of significant contamination. On one occasion, a sample of sediment obtained from a clean-out just outside of a university building in Washington was tested and proved to be fairly active. The deposit had undoubtedly resulted from disposal to the sewer two weeks previously of several dozen chick embryos into which P^{32} had been injected. In the other case, a laboratory sink and trap at the Army Chemical Center at Edgewood were found to be quite highly contaminated. Because of the intensity of radiation, the health physicist present would not permit the trap to be opened for the purpose of obtaining a sample of the material retained there.

"Model" System Assembled for Study

To study the tendencies for radioactive wastes to contaminate waste piping, and to obtain data under controlled conditions which could be used as a basis for calculating potential hazards, a "model" system was assembled at The John Hopkins University. The set-up consisted of some lengths of 1½ in. black and galvanized iron pipe and a variety of common fittings of black iron, galvanized iron, and brass, as shown in the accompanying figure. Three widely-used radioisotopes, I^{131}, P^{32}, and strontium-89 (Sr^{89}), were used in the form of sodium iodide, phosphoric acid, and strontium nitrate solutions, respectively. The pH of the solutions was adjusted with sodium hydroxide or hydrochloric acid. The solutions, simulating radioactive wastes, were introduced separately in one or two liter quantities at Point 1 on the sketch and collected at Point 4. Concentrations of radioactivity in both the influent and the effluent solutions were determined by evaporating two-milliliter samples of each solution in planchets and counting them with an end-window Geiger-Mueller tube.

The line was flushed out after each contaminating run, and the effluent flushing solution was also counted. Rate of flow through the 9 ft line was slightly more than 1 fps, and the total time of contact of most parts of the system with flowing liquid was about 7 sec per run. Several parts of the system were monitored internally by removing plugs and inserting a probe at the points of access marked (2), (3), and (4).

This probe consisted of a longitudinal glass wall Geiger-Mueller counter encased in a perforated, chrome plated brass shield.

What the Contamination Tests Showed

When carrier-free I^{131} solutions at pH 5.7 were passed through the system, 10 to 20 percent of the I^{131} present in the influent solutions was retained. As shown by Table 1, the average retention for eight runs was 15.7 percent. Considering the extremely minute quantities of I^{131} involved, saturation of the system could not be expected. With Sr^{89}, the average retention for three runs made at pH values of 1.0, 9.4, and 12.5, respectively, was 15.6 percent. However, considerably greater concentrations of strontium were involved than in the I^{131} runs, for stable strontium was present in the ratio of 4×10^8 parts to one part of Sr^{89}. In the tests with P^{32}, retentions ranged from 10 to 37 percent, averaging 22 percent for five runs. The pH values of the influent varied from 4.5 to 6.0, and stable phosphorus was present in the ratio of 4.3×10^5 parts to one part of P^{32}.

These tests demonstrated that significant amounts of radioactivity remained in the line when active solutions were allowed to flow through. Hold-up of liquid in the system was measured and found to be less than 2 percent of the volume of active solution used in each run. Therefore, only a small part of the diminution in radioactivity in the various effluents can be attributed to dilution of active solution by inactive flushing solution held in the line. Also, since the retentions are computed as percentage reductions in concentration, they are independent of the actual volumes of active solution involved. In view of this, it is believed that the retentions are due primarily to sorption of the isotopes on the metal surfaces or to formation and deposition of insoluble compounds of the isotopes in the line. Differences in retention among the different isotopes suggest that these sorption or precipitation processes are specific and depend upon the nature of the isotope present in the waste.

Monitoring of individual fittings and sections following the contamination runs gave a more detailed picture of the contamination. The I^{131} adhered slightly to both the horizontal and vertical pipe walls, and to a greater extent to the galvanized union and the galvanized cross-brass petcock combination, as shown by Table 2. Retention of small amounts of active solution in crevices, threads, packing, and depressions in the fittings would afford longer contact periods and tend to promote sorption of the isotope. In the case of a brass fitting, considerable contamination might be expected because of the tendency for insoluble cuprous iodide to form on the brass surfaces [Reference No. 6].

With Sr^{89}, the galvanized union and galvanized cross were again found to be more highly contaminated than the straight pipe sections. Adherence of strontium to the various surfaces increased with the pH of the active solutions. This probably resulted from the precipitation of strontium carbonate, which tends to form spontaneously under sufficiently alkaline conditions.

Greatest contamination of the individual components resulted from contact with the P^{32}-bearing solutions. The galvanized iron parts adsorbed the P^{32} much more strongly than did the black iron. Especially striking was the extent of contamination of the vertical galvanized pipe wall, as shown by Table 3. It is evident from these results that appreciable adsorption can take place in a remarkably short time.

To study the effects of longer contact periods on contamination, solutions of P^{32} at pH 5 and at pH 11, respectively, were allowed to remain in the galvanized trap for periods ranging from 1 min to 19 hr before removal. At the high pH, percentage retentions of 3.9 after 1 min, 21.2 after 1 hr, and 80.6 after 19 hr were noted. Trends of a similar nature, though less marked, were observed at the lower pH and also in tests with I^{131} solution at pH 5.5.

Tests Run on Decontaminating Piping

To determine the ease or difficulty with which the adsorbed or deposited substances could be dislodged, each contaminating run was followed by flushing of the system with one-liter quantities of hot water [70-80 C (158-176 F)]. Single water rinses were effective in removing, on the average, nearly 30 percent of the I^{131} present in the line. Second and third rinses, while removing more of the activity, were successively less effective than the initial flush. Internal monitoring showed that the horizontal black iron pipe section and

WHAT THE TESTS SHOWED

Solutions of I^{131}, Sr^{89}, and P^{32} at low levels of activity were passed through a 9 ft section of piping simulating an actual waste drain line. The pipes and fittings retained on the average about 16 percent of the I^{131} and Sr^{89} present in the solutions, and about 22 percent of the P^{32}. This retention is attributed in large part to selective sorption of the isotopes or deposition of insoluble compounds of the isotopes on the metal surfaces. In general, the more complex fittings were more highly contaminated than the straight sections.

Flushing the system with limited quantities of water proved only moderately effective in removing the activity present. Most complete removals of P^{32} were accomplished with highly alkaline solutions, while nitric acid rinses were most effective in reducing Sr^{89} contamination.

It must be borne in mind that this system was a relatively clean one. Drain systems in service for some time, unless occasionally subjected to strongly acid or alkaline wastes, may become coated with bacterial slimes on their interior surfaces, and deposits of rust, scale, and foreign material may accumulate. Presence of these substances, as well as the use of different materials, such as lead or stainless steel, could materially affect the extent of contamination. Nevertheless, the results of the tests affirm the indications from the field surveys that waste line piping can be contaminated by radioactive wastes.

TABLE 1—CONTAMINATION of drain piping system by Iodine 131

Volume of I^{131} solution used in each run: 1 liter.
Specific activity of I^{131}: Carrier free.
pH of all I^{131} solutions: 5.7.
Flushing solution: Hot water.
Volume used for each flush: 1 liter.

Run	Conc. of I^{131} in solution, $\mu c/l$ Influent	Effluent	I^{131} retained in system, percent	I^{131} remaining after flushing, percent
1	75.7	61.1	19.4	16.8
2	71.1	59.5	16.6	11.6
3	75.4	68.4	15.9	9.4
4	74.5	66.7	10.5	5.6
5	74.0	59.7	19.3	13.9
6	131	115	12.2	10.8
7	143	125	12.6	—
8	125	101	19.2	—
Average			15.7	11.8

TABLE 2—IODINE 131—Contamination of various components of system

Concentration of I^{131} in contaminating solutions:
Runs 1 — 5: 71.1 — 75.7 $\mu c/l$
Runs 6 — 7: 125 — 143 $\mu c/l$

Run	Contamination, net counts per minute (1) Horiz. iron pipe wall	(2) Vertical galv. pipe wall	(3) Galv. union	(4) Galv. cross & brass petcock
1	—	765	2701	4307
2	—	893	957	5326
3	1017	662	2525	4155
4	597	830	1805	3217
5	650	554	2814	4394
6	1972	964	9097	8476
7	1172	2002	5074	9644

the galvanized union were 70 to 80 percent decontaminated by the single rinses. The vertical pipe was much less efficiently cleansed, while the galvanized cross-brass petcock combination retained the major portion of its contamination. The use of larger quantities of water and continual flushing would no doubt have further reduced the levels of contamination, but it appears that water alone cannot be relied upon to completely remove adsorbed I^{131}, especially from brass fittings.

The Sr^{89} remaining in the piping after the contaminating run at pH 1.0 was easily washed away by the water. That deposited at higher pH values proved to be much more adherent, as shown by the data in Table 4. In the case of the galvanized cross, a build-up of activity was noted in Run 3. This may be explained by precipitated strontium being carried down from the upper parts of the system by the flushing action of the water and then being re-deposited at the lower end. Flushing with dilute nitric acid solutions was very effective in reducing the contamination present, probably because of decomposition of precipitated strontium carbonate contacted by the acid as well as surface cleaning action of the acid on the metals.

Phosphorus, which contaminated the system more readily than did the other isotopes, proved to be the most difficult to remove with water. Overall decontamination efficiencies of only 12 to 22 percent were obtained with single rinses, and secondary rinsing with water was quite ineffective. In one trial, continuous flushing with hot water for 15 min following a detergent rinse accomplished practically nothing. Detergent solutions (Alconox) and dilute nitric acid were both found to be somewhat more effective than water, and removals as high as 94 percent were obtained with sodium citrate solutions at pH 11.8 and strong sodium hydroxide solutions. Under extremely alkaline conditions, the adsorbed form of the P^{32} apparently becomes more soluble and is washed away by the solutions.

Evaluation of Health Hazards

Extensive contamination of drain lines may be expected at the facilities of the Atomic Energy Commission which handle large quantities of highly radioactive and long-lived substances. However, at such installations the disposal of wastes is strictly monitored, certain drains are restricted to high level wastes, and working areas are carefully surveyed so that health hazards are held to a minimum. At hospitals, industrial laboratories, and universities lesser amounts of activity are dealt with, but such close control is usually lacking. It is important, therefore, to know whether hazards are apt to develop at these places.

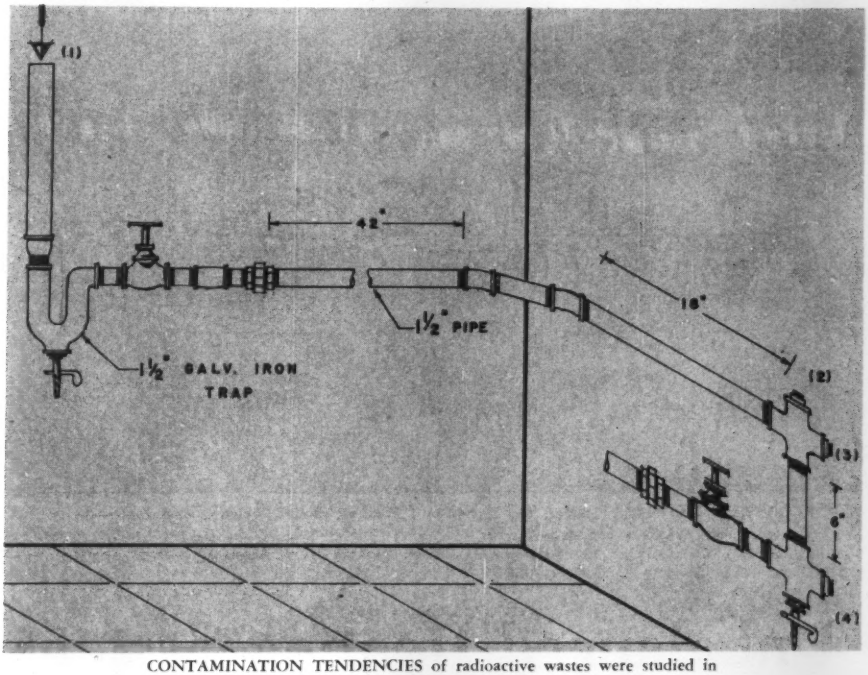
To get an idea of the magnitude of the radiation hazard that may develop at a hospital, let us assume that a strong dose of 100 millicuries (mc) of I^{131} is administered to a patient. Up to 90 percent of this iodine may be excreted within the first 24 hr, and if the total excretion is collected and disposed of one day later, about 75 mc may be poured down the drain. Basing our calculations on data obtained in the laboratory tests, about 16 percent or 12 mc of the I^{131} might be retained in the first 9 ft of the system. (This assumes batch disposal. If the constant drip discharge method described in the National Bureau of Standards Handbook 49 is used, the waste isotope may be in contact with the piping for longer periods and contamination may be greater, unless other liquids are also flushed down the same drain.) A person working 2 meters away from an exposed section of piping such as this would then receive radiation at the rate of 80 milliroentgens per hr (mr

TABLE 3—PHOSPHORUS 32—Contamination and decontamination of various components of system

Volume of P^{32} solutions: 2 liters.
Concentration of P^{32}: 10.7-16.4 $\mu c/l$
Specific Activity of P^{32}: 1.6 mg P^{31}/mc P^{32}

Run	Contamination, net counts per minute (1) Horiz. iron pipe wall	(2) Vert. galv. pipe wall	(3) Galv. union	(4) Galv. cross
1				
Contaminating*	1583	11,790	6754	12,990
Flushing (hot water)	—	9242	6162	10,700
Removal, percent	—	21.6	8.7	17.6
Flushing (detergent)	772	5876	2910	8514
Removal, percent	—	36.5	52.8	20.4
Flushing (hot water)**	750	5574	2909	5194
Removal, percent	2.9	5.1	Neglig.	39.0
2				
Contaminating (at pH 4.5)	1901	14,170	6656	17,860
Flushing (hot water)	1831	11,820	5345	13,570
Removal, percent	3.7	16.1	19.7	24.1
Flushing (Na citrate)†	909	750	1748	1933
Removal, percent	50.4	93.5	67.3	85.9
3				
Contaminating (at pH 5.0)	1659	5868	5537	8033
Flushing (hot water)	1343	3903	—	8528
Removal, percent	19.0	33.5	—	−6.2
Flushing (NaOH)††	771	363	1631	1275
Removal, percent	42.6	90.6	—	85.1

*One liter of P^{32} at pH 10.4 and one liter at pH 5.0 were passed through system.
**Water was flushed through system continuously for 15 min.
†Na citrate solution was at pH 11.8.
††100 grams of NaOH in two liters of water.



CONTAMINATION TENDENCIES of radioactive wastes were studied in this "model" system assembled at Johns Hopkins

per hr)*. A single flush with water might reduce the contamination present by 30 percent and the dosage rate would then drop to about 56 mr per hr. Even so, the weekly allowable whole body exposure to gamma radiation, 300 mr per wk, would be exceeded in less than 6 hr. It is possible that continual discharges could maintain this level of radiation in spite of the rather rapid decay of the I^{131}.

The hazard to one dismantling a part of the system can also be computed. A single fitting, even if made of brass, would be most unlikely to retain more than a third of the total amount of I^{131} present in the line. In this case, 4 mc might be held by the fitting, but flushing with water could bring this figure down 30 percent to 2.8 mc. A man working at a distance of 30 cm from an unshielded I^{131} source of this strength would receive radiation at the rate of 8.2 mr per hr.† This is well below the allowable limit of hand and arm exposure, and just above the continuous dosage rate permitted for whole body irradiation.

If the above assumptions and calculations are valid, it would seem entirely possible that a person working continuously at fairly close range to an unshielded section of piping contaminated by a gamma ray emitter could receive excessive radiation.

[*Concluded on page* 87]

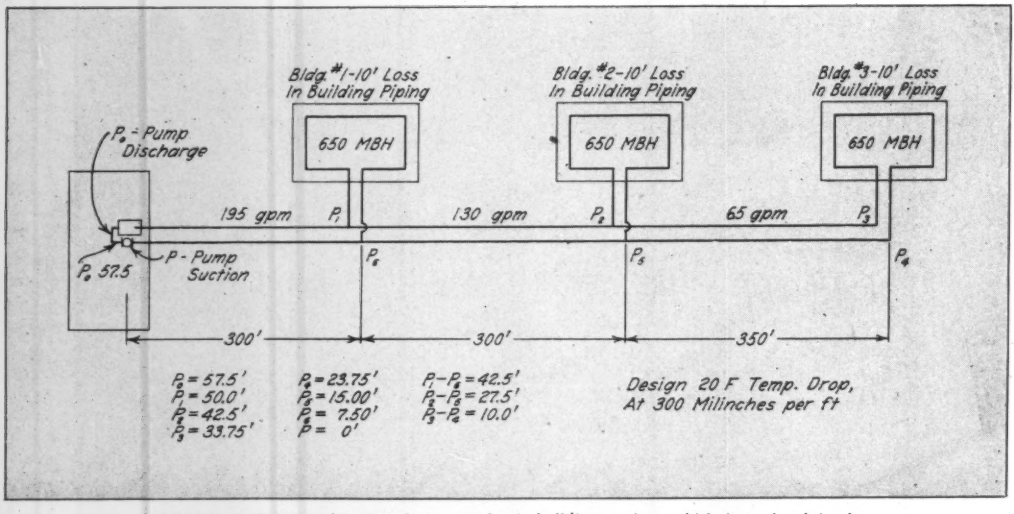
*The unshielded gamma ray dosage rate at 1 cm distance for I^{131} is 2.65 mr/hr/μc. [Reference No. 7]. Assuming the contaminated section is linear, the radiation intensity would be inversely proportional to the first power of the distance from the section, provided the distance is not greater than the length of the section. [Reference No. 8]. Assuming further that the pipe walls may be equivalent to as much as a half-value layer of shielding material, the dosage rate at 2 meters would be: 12 mc × 1/2 × 1000 μc/mc × 2.65 mr/hr/μc × 1/200 = 80 mr/hr.

†Assuming a point source of I^{131}, the inverse square law is applicable. The gamma dosage rate at 30 cm distance, assuming no shielding, would be: 2.8 mc × 1000 μc/mc × 2.65 mr/hr/μc × 1/900 = 8.2 mr/hr.

TABLE 4—STRONTIUM 89—Contamination and decontamination of various components of system

Volume of Sr^{89} solutions: 1 liter
Concentration of Sr^{89}: 11.9-14.0 μc/l
Specific Activity of Sr^{89}: 0.11 mc/g Sr^{89}
Volume of flushing solutions: 1 liter

Run	Contamination, net counts per minute (1) Horiz. iron pipe wall	(2) Vert. galv. pipe wall	(3) Galv. union	(4) Galv. cross
1				
Contaminating (at pH 1.0)	360	121	1141	795
Flushing (hot water)	B'k'd	B'k'd	97	189
Removal, percent	100	100	91.5	76.3
2				
Contaminating (at pH 9.4)	387	236	1670	1437
Flushing (hot water)	120	222	346	825
Removal, percent	69.0	5.9	79.4	42.6
3				
Contaminating (at pH 12.5)	1017	903	2375	2441
Flushing (hot water)	923	–	1392	2826
Removal, percent	9.3	–	41.4	–15.8
Flushing (hot water)	779	698	962	3630
Removal, percent	15.1	–	30.9	–28.4
Flushing (0.1 N HNO_3)	283	300	793	1575
Removal, percent	63.7	57.0	17.6	56.6
Flushing (1.0 N HNO_3)	136	72	256	575
Removal, percent	51.9	76.0	67.8	63.5
Total removal, percent	86.7	92.1	89.3	76.4



TYPICAL LAYOUT of piping for a multi-unit building project, which is analyzed in the text to show effects of unbalance

Unbalanced Heating System

. . . impairs functioning of centrifugal pump on forced hot water jobs. Examples show how to analyze possible difficulties in advance

By Harold A. Lockhart and Louis Oosten

Chief Engineer and Assistant Chief Engineer
Bell & Gossett Co.

A CONCRETE EXAMPLE of the effects of unbalance in a piping circuit for a forced hot water heating system is given in the accompanying sketch. It is a typical layout of a multi-unit building project. The distribution mains are designed on a direct return basis — that is, the first heating load taken off the main is the first to be returned. The building piping is laid out as one pipe circuits. This piping arrangement is one of inherent unbalance between building circuits.

Since, in conventional design procedures, the head of the pump is determined by the friction loss in the longest circuit, it is obvious that, unless properly balanced, the circuits for Buildings 1 and 2 will have greater flow rates than will the circuit for Building 3.

To illustrate the possible amount of unbalance between the circuits, consider the buildings in the sketch to have the following design conditions (MBH = 1000 Btu per hr):

Each building load .... 650 MBH
Total load ..... 1950 MBH
Friction loss in the piping of each building ..... 10 ft
Water temperature drop .... 20 F
Constant friction loss ..... 300 milinches per ft

Assume that length measurements include elbow equivalents:

300 ft
300 ft
350 ft
950 ft supply
950 ft return
1900 ft total equivalent length

(1900 ft × 300 milinches)/12,000 = 47.5 ft friction loss in distribution mains

[Note: There are 12,000 milinches in 1 ft].

47.5 ft + 10 ft (friction loss in circuits for Building 3) = 57.5 ft.

The capacity required in the pump is, therefore, 195 gpm (from previous article) at 57.5 ft head.

Referring to the accompanying

pump capacity chart, Pump B is shown to deliver 195 gpm at a 57.5 ft head. The curve shows that this pump has what is described as a steep characteristic — a point to be discussed later.

Conditions With the Pump Installed

With Pump B installed, the following conditions will occur in the system. Since the circuits for Buildings 1 and 2 are much shorter than the circuit for Building 3 (which was used to calculate the required pump head), the available head in these two circuits will be considerably higher. This will result in higher flow rates, and since the friction losses will increase accordingly, a reduced flow in the circuit for Building 3 can be expected. These facts can be illustrated mathematically.

The original calculation showed the required pump head to be 57.5 ft. This head occurs at P_0, the discharge side of the pump.

From P_0 to P_1 is 300 ft. Therefore:

(300 ft × 300 milinches per ft)/12,000 = 7.5 ft friction loss

57.5 ft — 7.5 ft = 50 ft head available at P_1

The available heads at the other points in the system are calculated in the same manner and are as follows:

P_2 = 42.50 ft
P_3 = 33.75 ft
P_4 = 23.75 ft
P_5 = 15.00 ft
P_6 = 7.50 ft
P = 0 ft

Knowing the available heads at the above points, the heads across the circuits for Buildings 1, 2 and 3 can be easily determined.

The available head in building Circuit 1 is represented by $P_1 - P_6$, or the pump discharge minus the piping losses between the pump and these points.

$$P_1 - P_6 = P_0 - [(P_0 - P_1) + (P_5 - P)]$$
$$= 57.5 \text{ ft} - [7.5 \text{ ft} + 7.5 \text{ ft}]$$
$$= 42.5 \text{ ft}$$

By similar process, the heads across the other circuits are:

Circuit 2: $P_2 - P_5$ = 27.50 ft
Circuit 3: $P_3 - P_4$ = 10.00 ft

The above figures show that the heads available in building Circuits 1 and 2 are greater than the friction loss of 10 ft as originally calculated. Therefore, the flow rates in these circuits will be higher than the original calculation of 65 gpm. Using the equation given in the previous article, the flow would be:

Building Circuit 1:

[42.5 (new head)]/[10(original head)] = [X (new flow)/65(original flow)]^2

X = 135 gpm

Building Circuit 2:

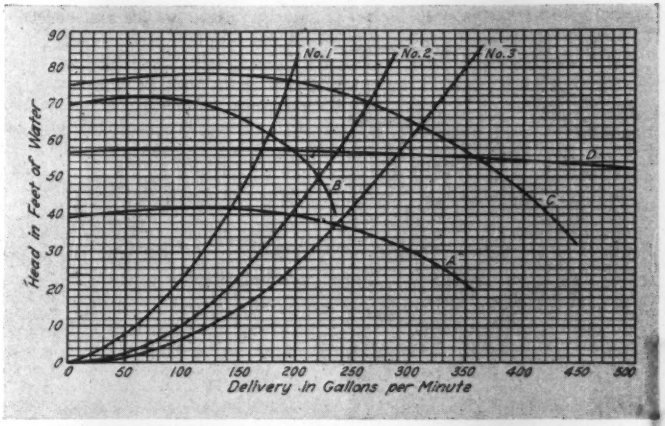
(27.5/10) = (X/65)^2,

X = 106 gpm

Building Circuit 3:

10 ft at 65 gpm

In the above calculation, it is assumed that the flow rate in building Circuit 3 will be maintained at 65 gpm. The total required pump flow will be 135 + 106 + 65 = 306 gpm. Examination of the pump chart shows that the selected Pump B cannot produce this flow at the required head of 57.5 ft.



TYPICAL PUMP CAPACITY chart, values from which are used in the examples in the text

Determining Actual Flow Rates and Heads

The actual flow rates and heads which can be developed within the capacity limits of Pump B can only be determined by the following cut and try method.

Since the flow in each circuit will be in proportion to the friction loss, an estimate of the ratios between flows should be made:

[135 gpm (flow in Circuit 1)]/[65 gpm (flow in Circuit 3)] = X/1, and X = 2.08.

[106 gpm (flow in Circuit 2)]/[65 gpm (flow in Circuit 3)] = X/1, and X = 1.63.

Flow	Ratio to flow in Circuit 3
Circuit 1: 135 gpm	2.08
Circuit 2: 106 gpm	1.63
Circuit 3: 65 gpm	1.00
306 gpm	4.71

Now select a flow value along the curve for Pump B, higher than the original 195 gpm and lower than 306 gpm. For a first trial, select 220 gpm at a 50 ft head. Using the ratios determined above, the flow rates in each building circuit change as follows:

Building Circuit 1: (220 gpm × 2.08)/4.71 = 97 gpm.

Building Circuit 2: (220 gpm × 1.63)/4.71 = 76 gpm.

Building Circuit 3: (220 gpm × 1.00)/4.71 = 47 gpm.

Next, recalculate the friction losses in the building circuits:

Building Circuit 1: [X (new head)]/[10 (original head)] = {[97 (new flow)]/[65 (original flow)]}^{2}, and X = 22.3 ft.

Building Circuit 2: X/10 = (76/65)^2, and X = 13.7 ft.

Building Circuit 3: X/10 = (47/65)^2, and X = 5.22 ft.

The friction losses in the distribution mains are recalculated in the same manner.

P_0 to P_1: [X (new head)]/[7.5 (original head)] = {[220 (new flow)]/[195 (original flow)]}^{2}, and X = 9.52 ft.

Note that the friction loss in this length of pipe has increased because of greater flow.

P_1 to P_2: X/7.5 = (123/130)^2, and X = 6.72 ft.

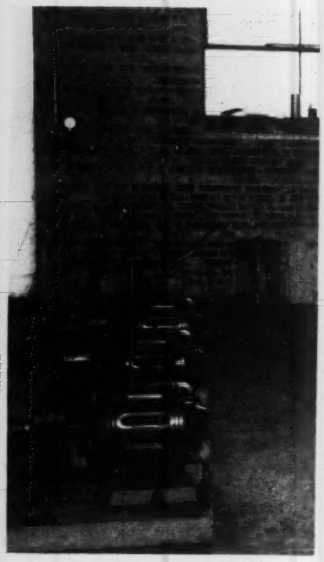
Note here that the new flow is the sum of the flows in Circuits 2 and 3.

P_2 to P_3: X/8.75 = (47/65)^2, and X = 4.6 ft.

The new friction losses in the return mains are calculated in the same manner (P_4 to P_5, P_3 to P_6, P_6 to P). The total losses add up as follows:

P_0 to P_1 = 9.52 ft
P_6 to P = 9.52 ft
P_1 to P_2 = 6.72 ft
P_6 to P_5 = 6.72 ft
P_2 to P_3 = 4.60 ft
P_4 to P_5 = 4.60 ft
Building Circuit 3 = 5.22 ft

46.90 ft



CAVITATION OCCURS if the absolute pressure at the pump suction drops below the vapor pressure of the fluid being pumped

Thus, the total friction loss in the longest circuit is 46.90 ft.

The heads available at the various points in the system are:

$P_0 = 46.90$ ft
$P_1 = 37.38$ ft
$P_2 = 30.66$ ft
$P_3 = 26.06$ ft
$P_4 = 20.84$ ft
$P_5 = 16.24$ ft
$P_6 = 9.52$ ft
$P = 0$ ft

The available heads for the building circuits accordingly become:

$P_1 - P_6 = 37.38 - 9.52 = 27.86$ ft.
$P_2 - P_5 = 30.66 - 16.24 = 14.42$ ft.
$P_3 - P_4 = 26.06 - 20.84 = 5.22$ ft.

More Than Calculated Will Flow

From these figures, it can be seen that a balance has not been achieved. According to the curve, Pump B will produce 220 gpm at a 50 ft head. The foregoing check indicates a flow of 220 gpm at a 46.9 ft head — therefore, more water than calculated will flow.

The friction loss in building Circuit 1 at 97 gpm is 22.3 ft, but $P_1 - P_6$ is 27.86 ft, indicating that a flow higher than 97 gpm will occur in this circuit.

The loss in building Circuit 2 at 76 gpm is 13.7 ft, but $P_2 - P_5$ is 14.42 ft, showing that the flow is nearly correct for the assumed conditions.

Accordingly, recalculation with other flows must be made until all losses are balanced. For the second trial, assume flows of 105 gpm in Circuit 1, 75 gpm in Circuit 2 and 45 gpm in Circuit 3 — a total of 225 gpm. The curve of Pump B shows this flow to occur at a 46 ft head.

Using the same methods of calculation as in the first trial, the results tabulate as follows:

Building Circuit 1	26.1 ft
Building Circuit 2	13.3 ft
Building Circuit 3	4.8 ft
P_0 to P_1	10.0 ft
P_0 to P	10.0 ft
P_1 to P_2	6.38 ft
P_5 to P_6	6.38 ft
P_2 to P_3	4.2 ft
P_4 to P_5	4.2 ft
Building Circuit 3	4.8 ft
	45.96 ft

The heads available at the various points in the system are:

$P_0 = 45.96$ ft
$P_1 = 35.96$ ft
$P_2 = 29.58$ ft
$P_3 = 25.38$ ft
$P_4 = 20.58$ ft
$P_5 = 16.38$ ft
$P_6 = 10.00$ ft
$P = 0$ ft

The building circuits, therefore, have the following heads available:

$P_1 - P_6 = 35.96 - 10 = 25.96$ ft
$P_2 - P_5 = 29.58 - 16.38 = 13.30$ ft
$P_3 - P_4 = 25.38 - 20.58 = 4.80$ ft

Checking the losses in the circuits against the available heads indicates that the assumption of a 225 gpm flow is sufficiently accurate to be within practical engineering limits.

The foregoing problem shows how it is possible for the pump to operate at a point entirely different from the design condition, and the need for balancing the various circuits of a heating system.

Using a Pump With Flat Characteristic

As previously stated, Pump B has a "steep" characteristic. Consider now the same problem, but with the selection of a pump having a "flat" characteristic — such as Pump D.

The original design called for 195 gpm at a head of 57.5 ft — a condition shown to be impossible for Pump B under the flow conditions. It is likewise an impossible condition for Pump D.

Therefore, for the first trial, assume a flow of 250 gpm, which occurs at 56.5 ft of head on the curve for Pump D.

In this case, the flow rates and heads in the building circuits are:

Building Circuit 1: 110.5 gpm, 28.00 ft friction loss.

Building Circuit 2: 86.5 gpm, 17.70 ft friction loss.

Building Circuit 3: 53.0 gpm, 6.75 ft friction loss.

Heads available at various points in the system are:

$P_0 = 60.23$ ft
$P_1 = 47.90$ ft
$P_2 = 39.28$ ft
$P_3 = 33.46$ ft
$P_4 = 26.71$ ft
$P_5 = 20.89$ ft
$P_6 = 12.30$ ft
$P = 0$ ft

Heads available in the distribution mains are:

$P_1 - P_6 = 35.60$ ft
$P_2 - P_5 = 18.39$ ft
$P_3 - P_4 = 6.75$ ft

Comparison of available heads and building circuit friction losses shows the system to be unbalanced. Recalculating on the basis of 249 gpm at 56.5 ft head results as follows:

Building Circuit 1: 116 gpm, 32.00 ft friction loss.

Building Circuit 2: 83 gpm, 16.30 ft friction loss.

Building Circuit 3: 50 gpm, 5.92 ft friction loss.

Heads available at various points in the system are:

$P_0 = 56.42$
$P_1 = 44.22$
$P_2 = 36.35$
$P_3 = 31.17$
$P_4 = 25.25$
$P_5 = 20.07$
$P_6 = 12.20$
$P = 0$

Heads available in the building circuits are:

$P_1 - P_6 = 32.02$ ft
$P_2 - P_5 = 16.28$ ft
$P_3 - P_4 = 5.92$ ft

The results in this trial are even closer than engineering accuracy requires. It can, therefore, be concluded that the flows produced in the system by Pump D will be essentially as indicated.

These two problems show clearly the wide variations in water flow which may occur in a piping system which is not balanced and between pumps of different characteristics.

In the first problem, using a pump with a "steep" characteristic, the final flow rate was 225 gpm as compared with the original calculation of 195 gpm. This is an overall increase of 15 percent in the system and 61.5 percent in building Circuit 1.

In the second problem, the flow of 195 gpm increased to 249 gpm. This represents an overall increased flow of 27.5 percent in the system and in building circuit 1 an increase of 78.5 percent.

Choosing Between Steep and Flat Characteristics

This may lead to the conclusion that a pump having a "steep" characteristic is the better selection. It is a valid conclusion only if the pump is selected on the flat portion of its curve.

An examination of a "steep" curve shows that over a portion of its range, a small change in flow is obtained for a relatively large change in head. Selection of a pump within this range may result in cavitation.

Cavitation occurs if the absolute pressure at the pump suction drops below the vapor pressure of the fluid being pumped. The fluid breaks apart into voids or cavities, which not only limit the discharge capacity but may also cause mechanical difficulties and pump failure. This is the reason for the familiar cut-off points on pump curves, which prohibit selection of a pump at too high rates of flow.

On the other hand, the selection of a pump with a "flat" characteristic may lead to excessive velocity, as a small decrease in friction loss results in a comparatively large increase in flow.

Regardless of which type of pump is used, it is evident that unless the head and capacity are matched to the piping circuit the system will not operate satisfactorily.

The foregoing discussion shows clearly that the over-large factors of safety frequently introduced by the designer are unwarranted and often lead to operating problems. It further shows that the unbalanced conditions which occur in a hot water heating system must be corrected either mechanically or hydraulically if the centrifugal pump is to function satisfactorily.

[In an article in the August HPAC, the authors explained the difficulties caused when pumps are oversized.]

RADIOACTIVE WASTES—

[*Concluded from page* 83]

On the other hand, it would appear that a man working on parts of a similarly contaminated line for a matter of a few hours would not be endangered. This latter statement is in agreement with the findings of Dr. S. Feitelberg at Mount Sinai Hospital in New York City [Reference No. 9]. Fixtures through which active wastes from the hospital flow have been dismantled and tested, and so far have been found below any degree of radioactive contamination that might be hazardous to men working on the fixtures.

With regard to maintenance work on the piping, it would further seem that the major concern should not be with the radiation itself, but with active deposits or residual active solution that might be present and with which a man could actually come into contact. For instance, Sr^{89} precipitated out at some point in a line in microgram quantities could be extremely harmful if ingested in some way by a worker oblivious to the danger. A line carrying radioactive wastes should always be monitored externally before proceeding with work on it; however, a beta emitter may scarcely be detectable through the pipe walls. Therefore, the simple precautionary measure of flushing out a drain line before beginning work on it is advocated in all cases. Flushing with water would remove or greatly dilute any active solution retained by the piping or fittings, such as in a trap. An acid rinse followed by a volume of strongly alkaline solution, a complexing agent such as Versene, a drain cleaner, or a commercial decontaminating agent (e.g., Radiacwash) could be employed to remove as much adsorbed or deposited radioactivity as possible, especially if there is a chance that one of the more hazardous isotopes may be present.

[This study was conducted under an Atomic Energy Commission contract.]

References Mentioned In This Article

1) National Bureau of Standards Handbook 49, Recommendations for Waste Disposal of Phosphorus-32 and Iodine-131 for Medical Users (1951).

2) E. H. Wakefield, Director, Radiation Counter Laboratories, Inc., Chicago, private communication (1949).

3) W. B. Lewis, Radioactive Contamination, lecture delivered at Chalk River, Ont. (1949).

4) G. W. Reid, D. W. Moeller, A. P. Talboys, and I. Grossman, Progress Report JHUX-3 to the Atomic Energy Commission on Concentration of P^{32} by Bacterial Slimes (1949).

5) F. A. Butrico, Disposal of Radioactive Wastes from Mass. Gen. Hospital, thesis MIT (1950).

6) A. P. Talboys, Contamination of Metal Surfaces by I^{131} in Solution, AEC Document NYO-1573 (1951).

7) E. H. Quimby, Calculation of Dosage Rate in Radioiodine Therapy, AEC Document AECU-51 (BNL C-5), p. 49 (1948).

8) W. H. Ray, Design and Operation of Radiochemical Laboratories, Health Physics Training Lectures, AEC Document AECU-817, p. 97 (1950).

9) S. Feitelberg, Physicist, Mount Sinai Hospital, New York, private communication (1952).

* * *

Monitors moisture content: Aerodynamic research on supersonic aircraft and guided missiles is being aided by a dew point recorder installed by the National Advisory Committee for Aeronautics in one of the nation's largest supersonic wind tunnels at Langley Field, Va. The instrument, which automatically and continuously measures and records dew point temperatures, helps guard against the condensation of moisture which causes flow disturbances in the test section of the 4 x 4 ft supersonic pressure tunnel. In attaining velocities up to twice the speed of sound, the air in the test section expands rapidly. This causes a sharp drop in temperature to values of minus 100 F or lower, depending on operating conditions. Moisture condensation in the test section tends to go up in proportion to the drop in temperature. To guard against this, the recorder is used to monitor the tunnel air to determine the rate at which dry air must be bled into the tunnel to keep the moisture content low enough to avoid excessive condensation, according to General Electric Co. engineers.

FIG. 1—EARLIER DESIGNS of the ceiling comprised square perforated aluminum panels held in intimate contact with square pipes by means of separate clips

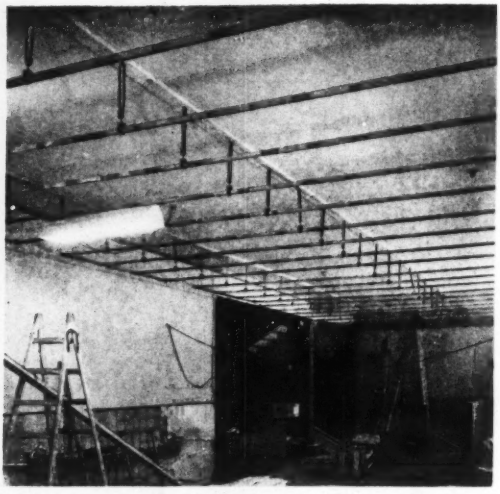


FIG. 2—MODERNIZATION of an old building in Oslo was achieved by suspending the grid coils from the original ceiling, reducing the ceiling height

Radiant Heating, Cooling

. . . . . combined in method of ceiling construction used on a number of projects, including new Alcoa building

By Gunnar Frenger and Dudley W. Day

A SNAP-ON ALUMINUM panel ceiling, combining radiant heating and cooling with acoustic control, has been tested in actual use in Norway since 1945. Installations of this type in other countries include the new Aluminum Co. of America office building in Pittsburgh, and the United Nations building in Paris.

The method offers a functional ceiling serving to heat or cool by radiation, provide the desired acoustical control, and distribute ventilating air into the room evenly and without drafts. Each of the functions of radiant cooling, acoustic control, and ventilation is optional, depending upon the conditions of a particular installation. Heat insulation is also automatically a function by virtue of the inherent thermal characteristics of the sound absorbing materials used in acoustic ceiling treatments.

Mr. Frenger, of Oslo, Norway, is the inventor of the ceiling construction described. Mr. Day is Vice President, Architectural Products Div., Burgess-Manning Co.

Pilot Design Built, Tested in 1945

Following laboratory consideration of various alternative forms of design in Oslo in 1944, the first pilot ceiling was built and tested in 1945. Concurrently with the test work, mathematical analyses were simplified for calculating the heating and cooling capacities.

The early ceilings consisted of square perforated aluminum panels held in intimate metal-to-metal contact with square pipes by means of separate clips, as shown in Fig. 1. The pipes were suspended below the main ceiling structure, being welded together to form the complete grids.

The opposite edges of the panels are bent up to form contact flanges,

FIG. 3—HERE'S HOW the building shown in Fig. 2 looks after installation of the new ceiling. Extensive building alterations were not required

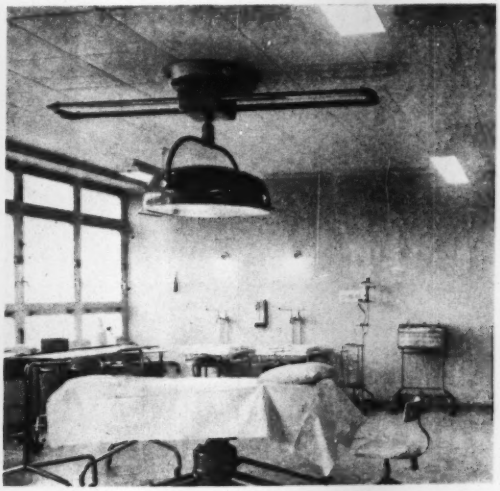


FIG. 4—THE FIRST HOSPITAL installation was made in Norway. Because of strict cleanliness requirements, unperforated panels were used on this job

matching contact clips on the pipes. By this design, the panels can be installed rapidly by pushing them upward toward the pipes. In this way, the contact flanges are clamped between the clips and pipe surfaces to provide good thermal contact for the desired flow of heat between pipes and panels. The pipes serve both as fluid conducting heating and cooling elements and also as suspension supports for the panels.

If it is desired to use the suspended ceiling for the distribution of ventilating air into the room below, the air may be introduced into the plenum chamber above the panel structure and passed into the room in a multiplicity of small streams between adjacent panels. By using this system of air distribution, it is found that during the heating cycle the ventilating air can be introduced into the plenum chamber at a relatively low temperature.

The radiant panel ceiling here described offers a number of collateral advantages. Building procedure is simplified in that plumbing, electrical wiring, and other services can be installed freely in advance below the main ceiling, as this equipment will later be covered by the suspended ceiling panels. The removable panels also provide access to any such equipment.

The high thermal conductivity of the ceiling from the pipes to the exposed radiating surfaces and the low heat storage capacity of the structure permit close control with simple equipment. Depending upon particular conditions, the system may be controlled generally for an entire building; zone control may be employed, or individual thermostats may be provided in each room to control a circulating pump or motorized valve. The ceiling grids may be connected to any suitable hot water boiler with connections to a chiller if the ceiling is to be used for cooling as well as heating.

The suspended ceiling can be installed at any convenient time after the steel framework or the concrete building structure is completed. Considerable leeway is permitted in this respect.

American Development of the Method

In the American development of the ceiling, several modifications and improvements have been made. The surface is composed of panels of perforated heavy gage aluminum, selected for maximum thermal conductivity, with a baked on enamel finish chosen for its high light reflection. The entire surface is perforated with a 10 percent open pattern for maximum acoustical transparency in the audible range.

Hot water coils are attached to 1½ in. channels spaced on 4 ft centers, which in turn are supported by ⅛ in. pencil rods at 4 ft intervals. Headers are 1¼ in. IPS black iron or aluminum pipe with drawn outlets fabricated to exact specifications. The aluminum surface panels are snapped onto the coil laterals and may be removed to service mechanical work above the ceiling. The acoustic-thermal blanket is laid wall to wall over the heating coils. The blanket is composed of glass fiber insulations using various vapor barriers and heat reflecting surfaces.

Hot water which flows through the system is heated by a conventional boiler or other source. Standard controls are used to control water circulation. In warm weather, cool water is circulated through the system, providing radiant cooling.

While the aluminum panels, which are prefabricated, and the other special parts of the ceiling are supplied by the manufacturer, the actual installation is done by local contractors who furnish the balance of the material.

The suspended ceiling system is adapted for modernization of old buildings, as well as for original installation in new buildings, as extensive building alterations are not required. An installation in an old building in Oslo, shown in Fig. 2, is

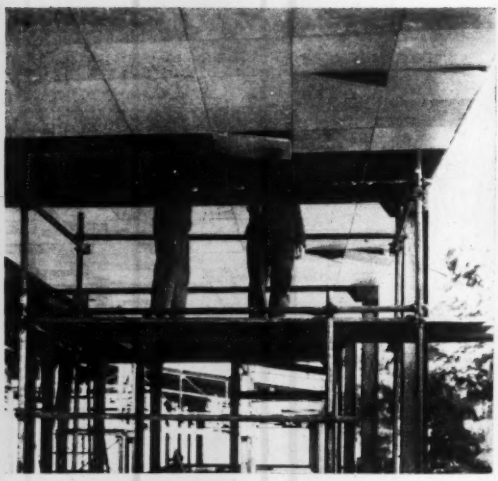


FIG. 5—UNITED NATIONS building in Paris has approximately 100,000 sq ft of ceiling surface. This was—to a considerable extent—a prefabricated structure

FIG. 6—PARTIAL VIEW of ceiling grids and air conditioning ducts in the new 30 story Aluminum Co. of America office building in Pittsburgh

FIG. 7—PREFABRICATED GRIDS being installed in the new Alcoa building. They are of prefabricated aluminum headers to which ½ in. laterals are welded

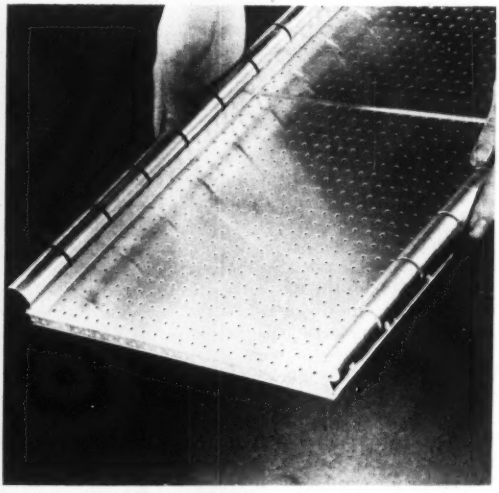


FIG. 8—PERFORATED ALUMINUM ceiling panels, 0.040 in. thick, for the Alcoa building are fastened to the pipe grids. Fiber glass blanket covers grids

an example. The grid coils are shown suspended from the original ceiling. In this modernization process, the ceiling height of the old room was considerably reduced by the rather extraordinary spacing of the suspended ceiling below the old ceiling. The completed installation is shown in Fig. 3.

The first hospital installation of this system was made in the new Norwegian government hospital in Oslo. Fig. 4 shows one of the operating rooms. Because of the strict cleanliness requirements of the operating rooms, unperforated panels were used and ventilating air is conducted to the operating rooms by ducts covered by the suspended ceiling and fitted with germicidal filters.

A large installation of this type is that in the United Nations building, in Paris (Fig. 5). This was, to a considerable extent, a prefabricated structure and includes approximately 100,000 sq ft of ceiling surface. In this particular case, the suspended

FIG. 9—SPECIAL TOOL was developed to snap ceiling panels into place quickly and efficiently, in making the installation at the Alcoa building

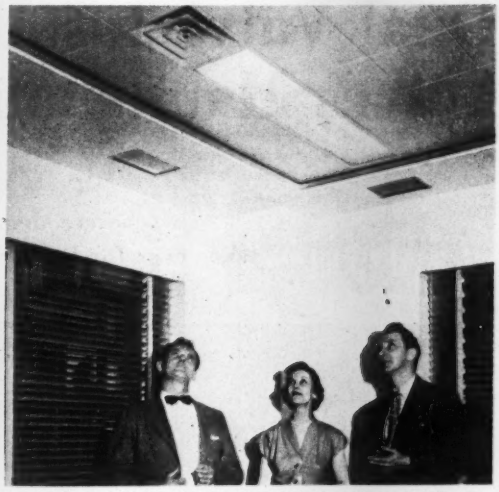


FIG. 10—COMPLETED CEILING in Alcoa building looks like this. Ventilating air is discharged through diffuser. Openings near wall are return air intakes

ceilings were installed before the outer walls and windows were put in place.

At the Aluminum Co. of America's new 30 story office building in Pittsburgh, the ceiling covers 250,000 sq ft and is a major factor in the saving of 15,000 sq ft of rentable floor space. The installation is one of the first — and the largest — of its kind in the U.S. It is illustrated in Figs. 6, 7, 8, 9 and 10.

The ceiling is of 0.040 in. perforated aluminum sheet panels, suspended below grids of ½ in. aluminum tubing installed on 1 ft centers. The grids are prefabricated in sections approximately 6 x 12 ft. Hot or cold water is circulated through the grids to provide radiant heating in cold weather and radiant cooling in warm weather. The grids are covered by ¾ in. thick glass fiber insulation blankets to absorb unwanted room sounds and for thermal control.

Some 10 miles of aluminum drawn outlet headers are used on the Alcoa installation. These prefabricated headers were furnished in 19 ft, 2 in. lengths with drawn outlets every 12 in.

The radiant heating system is designed to afford complete heating of the building and 50 percent of the summertime cooling, the remainder being provided by air conditioning units which also take care of all dehumidification.

Water for the heat exchangers will be heated by steam purchased from the Allegheny County Steam Heating Co. Water for radiant cooling and air cooling will be cooled by two 625 ton centrifugal compressors located in the basement and using a cooling tower for condensing.

For flexibility of heating and cooling control, thermostats will be located in a typical room for each zone on each floor. Corner and executive offices have additional individual controls to provide for special conditions. Thus, panel output can be varied by modification of the water temperature flowing through the grids. Specifications call for approximately 30 percent relative humidity, when the outside temperature is 95 deg.

Architects who designed the Alcoa building are Harrison & Abramovitz, with Mitchell & Ritchey and Altenhof & Brown, as associate architects. George A. Fuller Co. is the general contractor and Jaros, Baum & Bolles, the mechanical consulting engineers. Dravo Corp. is the heating, ventilating and air conditioning contractor.

ASKS DETAILS ON KITCHEN EXHAUST HOOD

I WOULD APPRECIATE further details on the kitchen range exhaust hood in the cafeteria described by George G. Reed in his article in the March HPAC.

Can you advise me about the construction of the hood, explain the use of the slide vents, tell me if grease filters are used, and inform me if the hood has proved satisfactory? —M. J. COLLINS.

REPLY BY THE AUTHOR — Here are my answers to these questions:

1) The framework of the kitchen hood consists of 2 in. by 2 in. by ¼ in. angles. The sheet metal is 20 ga galvanized steel. The hood is 21 ft long by 8 ft wide by 4 ft high.

2) The slide vents were included so that the amount of air exhausted from around the edge of the hood and from the inside top of the hood could be controlled. Exhausting some air from the top of the hood helps prevent steam from billowing out from under the hood.

3) No grease filters were used with the hood as no great fire hazard was involved due to the location of the kitchen hood. The hood was designed so that the entering air expands and cools; therefore, any grease is deposited on the inside of the hood and is collected in the trough around the edge of the hood.

4) The hood has proved very satisfactory, the conditions in the kitchen are very pleasant and there are no evidences of any grease in the exhaust ducts.—GEORGE G. REED, Mechanical Engineer, Lewis Flight Propulsion Laboratory, National Advisory Committee for Aeronautics.

Dual Valve Installation Solves Maintenance Problem

Cycle for cooker in processing plant resulted in severe demands on valve. Smaller valve in bypass takes over for low flows, corrects the trouble, cuts maintenance

By G. W. Hauck
Manager, Engineering Sales
Crane Co.

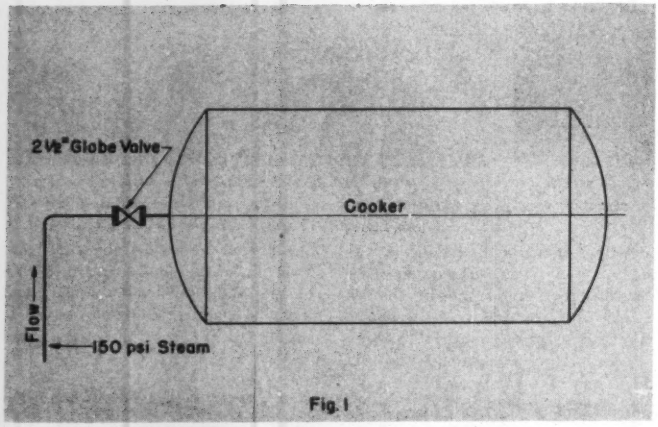


Fig. 1

THE PROBLEM — Cycle of operation of this cooker in a processing plant inflicted brutal service on the 2½ in. valve, as it had to be opened wide, gradually closed, left barely open, opened wider, again gradually throttled, and finally shut

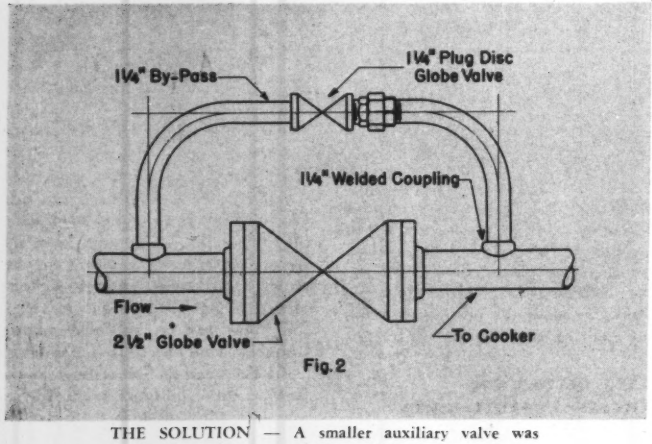


Fig. 2

THE SOLUTION — A smaller auxiliary valve was installed in a bypass around the 2½ in. valve. Larger valve is now used for full flow or moderate throttling, and smaller valve takes over the regulation whenever minimum flow of steam is needed

AN AUXILIARY VALVE can be a mighty handy piece of equipment.

For instance, the installation of an auxiliary valve in a bypass around a main control valve can frequently solve a flow problem and also reduce maintenance costs appreciably. This device has worked successfully in the installation described in the following example. Perhaps similar situations exist elsewhere — and oftener than might be imagined.

Processing Cooker Cycle

Severe Valve Application

Fig. 1 shows the piping hookup for the steam supply to a cooker in a processing plant. A 2½ in. line supplies saturated steam at 150 psi. The original control of flow was accomplished through a 2½ in. hand operated globe valve. This valve was vital to the processing operation but the manner in which it had to be operated resulted in severe usage.

The cooker is charged with the material which is to be processed. During the cycle of processing, the material must be held at varying temperatures for stated periods of time. The 2½ in. globe valve is opened wide initially and kept open for perhaps 20 minutes in order to bring the material up to a predetermined temperature quickly.

Before the desired temperature is reached, the operator gradually closes the valve, thus throttling the flow of steam. The valve is then barely open, admitting just enough steam to maintain the required temperature for a given period of time. Then, to

Mr. Hauck is a member of HPAC's board of consulting and contributing editors.

achieve higher temperature, the valve is opened wider and again gradually throttled and held for another interval.

Eventually, the processing is completed by shutting off the steam flow and introducing a vacuum.

Valve Trouble Was Inevitable

Such a cycle of operation, when repeated a few times daily, inflicts brutal service upon the valve. It is in a closely throttled position much of the time. With the disc barely lifted from the body seat ring (cracked open), wiredrawing or cutting of the seating surfaces is inevitable. It is only a question of time until the valve seating is no longer tight.

In the installation used as our example, leakage precluded effective control and necessitated shutdowns for repairs. It became necessary to seek some means of avoiding these shutdowns.

The Problem Has Three Elements

The problem consisted of three elements:

1) A 2½ in. valve was needed for full flow part of the time.
2) Somewhat reduced valve openings were needed at other times.
3) A very small valve opening was necessary for appreciable periods.

Accomplishing these three objectives with a single valve and achieving a trouble-free installation is virtually impossible. It is too much to expect if periodic repairs and maintenance costs are to be avoided or reduced to a minimum.

How the Problem Was Solved

The solution of this problem is illustrated in Fig. 2. A 1¼ in. auxiliary valve was installed in a bypass around the 2½ in. main valve. The size of the bypass was determined by calculating the areas of seat openings needed for the various rates of flow which occur during the processing cycle.

Both valves are equipped with plug type seats and discs, an ideal type of construction for throttling services and giving control of flow which is proportional to the number of turns open.

Two Valves Give Needed Flexibility

This combination of two valves provides flexibility. It enables the operator to control flow better and without subjecting either of the valves to severely close throttling and resultant wear.

This dual valve hookup finds the 2½ in. valve used for full flow or for flow which involves only moderate throttling. Whenever minimum flow is needed, the 2½ in. valve is closed tight and the 1¼ in. valve is used to take over the regulation of flow.

When minimum flow occurs, the 1¼ in. valve is open much wider than the 2½ in. valve would be for identical flow. Under this condition, the smaller valve will permit closer regulation of flow than the larger valve. Also, the smaller valve, being wider open, will be subjected to appreciably less wear of the seating surfaces than would occur in the larger valve when it is very closely throttled.

Shutdowns Reduced, Maintenance Lowered

The revised hookup (Fig. 2) has been in successful operation for some time, with a gratifying reduction in shutdowns for repairs and a minimum of maintenance. It was simply a case of relieving one valve of abnormally severe duty and having an auxiliary valve reduce the abnormal to a normal operating condition.

CENTRALIZED INFORMATION ON PREVENTING DETERIORATION

LET ME ACKNOWLEDGE the kind remarks, published in the August issue, by Gunnar C. F. Asker, with respect to my article on the Reserve Fleet.

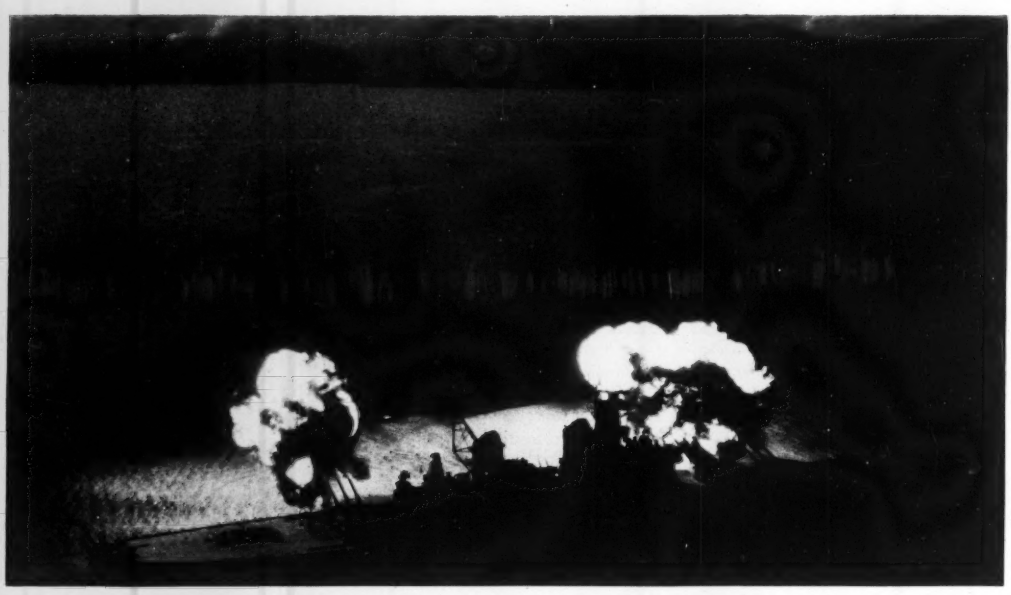
Like most other naval projects, the preservation of the Reserve Fleet would have been impossible without materials and equipment developed and produced by industry. Mr. Asker has been among the leaders in the development and production of dehumidification equipment not only for the Reserve Fleet but also for other defense activities and the public. He speaks with some authority, therefore, when he proposes a central U. S. Government Materials Preservation Bureau.

In my opinion, however, the problems of preservation of the various activities of government are so diversified and so widely dispersed that such a bureau could not handle them with a greater overall efficiency than is presently being attained by the individual agencies. Further, such a bureau would tend to eliminate the competition of ideas which results from the many individual attacks on these problems and which produces a gradual improvement in equipment and techniques which eventually become available to all hands.

More to the point in my opinion would be a central clearing house for information, to which each preservation activity could contribute its experiences or could appeal for specific assistance in the solution of a preservation problem. The Prevention of Deterioration Center of the National Research Council is attempting to fill this need on a long range basis. The Prevention of Deterioration Center has published a number of pamphlets on various aspects of preservation based upon contributions from authoritative sources in government and industry and sometime in 1952 will publish a compendium of its work to date in the form of a volume entitled Introduction to the Prevention of Deterioration of Materials. Information on the pamphlets or the new volume may be obtained by writing to the Prevention of Deterioration Center, National Research Council, 2101 Constitution Ave., N.W., Washington 25, D. C.—ALBERT S. GATES, JR., Head, Dehumidification and Submarine Air Conditioning Sections, Bureau of Ships, Navy Dept.

* * *

Copper: An order issued by the NPA August 4 removes prior restrictions on the manufacture or assembly of copper and copper base alloys, or component parts made of these materials, for certain items (including unit heaters) in List A of Order M-74.



TO HOW GREAT AN EXTENT our strategic choices in Korea would have been limited without the Reserve Fleet, only a high-level naval strategist (and perhaps not he) could venture

The "Mothball Fleet" Pays Off

Results of Navy's Dehumidification and Preservation Program Show Its Worth

By Albert S. Gates, Jr.
Head, Dehumidification and Submarine Air Conditioning Sections
Bureau of Ships, Navy Department

As WORLD WAR II drew to a close in the Pacific, the U.S. Navy set in motion the elaborate program by which conservation of our enormous national capital investment in ships was to be accomplished. A new naval organization called the Reserve Fleet — and promptly labeled the "Mothball Fleet" in the public press — was established. Despite difficulties due largely to rapid demobilization, the practical nature of the program has now been established.

Having demonstrated that it is possible, the question arises whether it has been worthwhile. When the Reserve Fleet was first being considered, it was pointed out that a given design of naval vessels becomes practically obsolete in 20 years anyway. It was argued that if we must preserve something, it would be better to preserve the great number of merchant vessels, which would be useful for transport as long as we had command of the seas, and to scrap the excess combatant vessels — devoting the funds saved to the building of new ones. This argument certainly had cogency right after World War II, when no one could imagine that within five years we would be fighting in Korea. Since the outbreak of hostilities in Korea, over 500 vessels have been activated from the Reserve Fleet and have taken their part in the Navy's operations in the Far East. Many of the vessels at the Inchon landing and later at the Hungnam evacuation

All illustrations are Official United States Navy Photographs.

had been snugly tied up to a dock in some Reserve Fleet group not many months before.

In reviewing the history of the past five years, it is obvious that the changes in the international situation took place at a rate with which no shipbuilding program could possibly keep pace. Without the Reserve Fleet, the contraction of the active Navy in the first few years after the war would have resulted in the scrapping of a lot of vessels. The rapid build-up which then became necessary on account of the Korean situation could never have been achieved if the needed vessels had had to be built instead of merely activated from the Reserve Fleet. It is evident, therefore, that the Reserve Fleet introduces some new concepts into naval planning.

Formerly, the limitation on the rate of naval expansion was the capacity for building ships, and this limitation becomes more serious as naval warfare becomes more complex and the lead time for ship construction becomes greater. With the Reserve Fleet, the limitation on naval expansion is manpower — not vessels — and the emphasis can be placed on the development of a strong Naval Reserve. Formerly, when it was necessary to curtail the expenditure of funds, rather than scrap vessels the entire fleet would be operated with reduced manpower. Now it is possible to keep the active part of the Fleet at high manpower strength by inactivating vessels which it is not necessary to keep in immediate active service.

Further, the composition of the Fleet can be changed on fairly short notice to suit a particular situation or accomplish a particular task, giving it a great versatility and flexibility at a minimum operating cost. This factor is one of the considerations which governs our current building program.

To how great an extent our strategic choices in Korea would have been limited without the Reserve Fleet, only a high-level naval strategist — and perhaps not he — could venture to say. How great an advantage this freedom has been to us is purely conjectural, but certainly it has been of tremendous value.

Thus, the program has been worthwhile — but has it been too

Dehumidification is one of the most (if not the most) important techniques involved in the Navy's preservation of inactive ships under its so-called mothballing program. Results of the program and its value to the nation are discussed in this authoritative article. It would seem that the basic idea might be employed in a number of ways by industry

costly? Here are the figures:

Cost of inactivation of approximately 2300 vessels $110,000,000
Material and services for maintenance of Reserve Fleet, 6½ years to January 1952 .....$381,500,000
Costs for naval personnel assigned to the Reserve Fleet, covering pay, allowances, subsistence and clothing, for 6½ years to January 1952, computed from totals for the Navy fiscal 1947 through 1951 .....$426,000,000
Investment in berthing facilities $69,720,000
Total expenditures for Reserve Fleet for 6½ years $987,220,000

We can add to this figure:

Activation of 525 vessels for assignment to the Fleet during fiscal 1951 and 1952. Includes cost of a complete overhaul and cost of certain improvements necessitated by advances in naval warfare .$192,201,000
Activation of 208 vessels for transfer to foreign governments, for the Military Sea Transport Service, etc. $113,000,000
Total costs for activation ..$305,201,000
Grand total expenditures .$1,292,421,000

What have we got for this huge expenditure? The estimated original cost of the 525 vessels activated for assignment to the Fleet is $2,958,000,000 and the replacement cost at the time of activation is estimated at $5,875,000,000. We have thus already got back every cent we put in 2¼ times, or 4½ times — however you choose to look at it — and have outfitted the Military Sea Transport Service and greatly strengthened the navies of our allies besides. We have done this without straining our economy with an emergency shipbuilding program.

Or, to put it another way, the original cost of the 2300 ships was $13,500,000,000 and replacement in today's market would cost $32,500,000,000. We have spent $987,220,000 to preserve this valuable asset about six years, an annual insurance premium of around 1.2 percent or 0.5 percent, depending on which cost figure is used. The "Mothball Fleet" has paid off, without a doubt.

The Demothballing and Activation Process

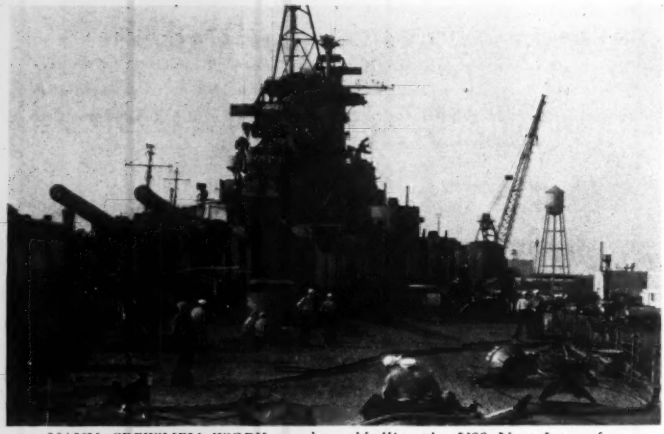
The demothballing and activation of a ship demonstrate the possibilities in the planned coordination of which the Navy is capable. The order to activate a given vessel goes out by dispatch from the Chief of Naval Operations to certain key points, and within a few hours actions of the most diverse kinds necessary to get the ship operating are underway at the most widely separated points.

The Bureau of Naval Personnel goes into action and the men who will constitute a complete crew, with the training and skills necessary to man the newly active ship, begin converging on the shipyard which will do the activation, from other vessels or naval establishments, from boot camp, and in the case of Reserves, from their civilian jobs.

Supply activities immediately honor requisitions which have been previously prepared and held ready, and a stream of materials of all kinds — provisions, paint, missing tools and spare parts, meat, drugs and medicine, chronometers, charts, candy bars, shoes and sealing wax — begins flowing to the ship. In the activating yard, previously prepared work lists are broken out, the shops begin to build the new structures or parts which may have been scheduled for installation, a schedule for drydocking is set, a berth assigned, and the painters, shipfitters, welders and mechanics are mustered.

The ship meanwhile is broken out of her inactive berth and towed to the activation yard, which in some cases may be hundreds of miles away. As soon as the gang plank is set, the army of workmen swarms aboard, and the crane which set the gang plank moves into position to lift off dehumidification equipment, sheet metal covers from the guns and searchlights, and other preservation material which the ship will no longer need.

The activation is started by, and proceeds under the instruction of, a trained activation team from the Reserve Fleet Group. The activation is carried out in five phases, which are completed in order but which proceed simultaneously and more or less independently of each other.



NAVY CREWMEN WORK on de-mothballing the USS New Jersey for re-commissioning

In the first phase — Make the Ship Habitable — the ship is opened up, the ventilation, heating, sanitation, refrigeration and galley facilities are checked out and put in service, and the members of the crew who have arrived begin to live aboard.

Under the second phase — Make the Ship Safe — fire mains and fire-fighting equipment are put in shape, ladders and safety lines checked and repaired, emergency power equipment readied, and the watch lists established.

In the third phase — Make the Ship Self Sustaining — one boiler at least is started, the power and lighting generators are put in operation, the ships' boats are slung in the davits, the ship may be dry-docked (otherwise, divers go down and remove the seals from various underwater openings).

Make the Ship Operational is the phase in which the ship first leaves the dock under its own power, to test out the main propulsion plant, the anchor and boat handling gear, etc., and to give the new crew its first chance to work the ship.

During the last phase — Make the Ship Ready for Sea — complete stores are taken aboard, the last missing items of equipment and parts are checked and obtained, the latest members of the new crew arrive aboard, and the ship prepares to report to the Fleet. Unless the inevitable repairs which must be made prove to be very extensive, or a time-consuming alteration is required so that the ship can operate adequately with the modern Fleet, this whole process of activation is completed in 30 days.

A New Part of the Navy

It is probably safe to say that most of the naval personnel who reported for duty in the Reserve Fleet when it was first organized did so with no great enthusiasm. The war — in which their tasks had been a high fulfillment of the careers for which they had been trained — was over, and they realized they must return to more humdrum duties. However, an assignment to superintend the gradual deterioration of a great fleet — as, from their knowledge of past attempts to preserve ships, they expected this new job to be — was a prospect to dishearten anyone who had devoted his life to the Navy.

When it became apparent, however, that the techniques for preservation which were to be applied had a good chance of proving really effective, that the Reserve Fleet was planned to become a true Fleet auxiliary, and not just an aggregation of mouldering ships, and that nothing stood in the way but a vast amount of hard work, they pitched in and made the program a resounding success.

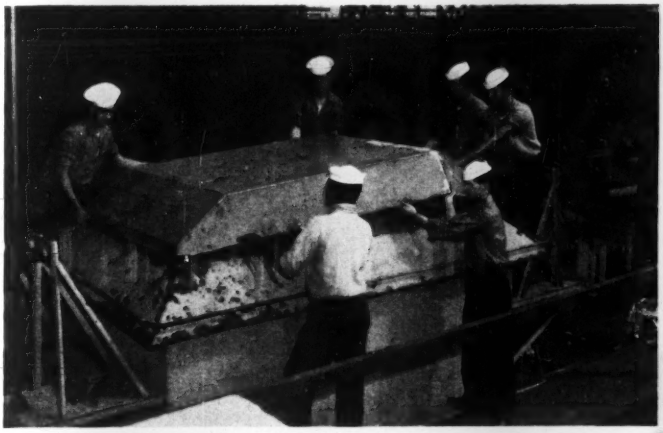
Today, the Reserve Fleet, which does its job with less than 2½ percent of the total officer strength and 5 percent of the enlisted strength, is a distinct task group within the Navy organization, with a high

INTERIOR OF AN AIR compressor is examined aboard a naval vessel prior to assembly

esprit-de-corps, a past record of outstanding achievement and valuable contributions to the mission of the Navy, and an important and difficult assignment. A tour of duty in the Reserve Fleet can be regarded as naval service of the most useful, difficult and instructive kind, which a naval careerist can embrace with enthusiasm and look back on with pride.

The Reserve Fleet is now so thoroughly an integral part of the Navy that it is difficult to recall the time when this was not so. Yet in 1944 and 1945 it was just an idea — and an idea which high naval authority could justly view with some skepticism. This idea was based on preservation techniques in which only a limited informed number had faith, and which had been demonstrated and explored on a relatively small scale for a short time only. It meant the undertaking of an industrial enterprise on a vastly greater scale than ever before attempted using naval personnel, and with personnel trained for the operating Fleet — not for industrial duties. It meant an investment in facilities, equipment and manpower as great as the whole annual naval appropriation of 20 years past. It required unflinching boldness, since the opportunity would pass forever during an extensive period of testing and research. In short, it involved a calculated risk of a magnitude without precedent in peacetime. That this risk was calculated and boldly taken represents to my mind the functioning of the government in a manner most worthy of our traditions.

The names of those who made substantial contributions to the idea of the Reserve Fleet or who discovered and developed the techniques on which it is based would make a list of many pages. But the translation of this idea into an approved program required a constructive and far-ranging imagination to appreciate its true possibilities; a confident judgment of its practicality; a faith in the versatile capability of the Navy which would have to make it work; the self-confidence, persistence, knowledge and persuasiveness to convince higher authority; and the willingness and ability to do the work of getting it approved and started.



AN AIRTIGHT COVER is removed from a smoke stack opening preparatory to lighting off the boilers

These needs were supplied by Captain H. Gordon Donald, USN, since retired. When the matter came to a head, he occupied the responsible post in the Bureau of Ships. Once having convinced himself of its soundness, he did not permit himself or anyone else to entertain any doubts about the program, or to enjoy any relaxation from thinking and working for it. He drove his subordinates, badgered his superiors, and performed three men's work himself, until the Reserve Fleet was firmly established. To him more than to any one man the Reserve Fleet owes its existence today. It was granted to him, in the final assignment of his naval career, to accomplish a major stroke of naval policy of which any officer in our history could be proud.

[This is the second of two articles by Mr. Gates on this subject. The first appeared in the July HPAC.]

AIR CONDITIONING THE "UNITED STATES"

HAVING SPENT THE greater part of the past three years working on the design of air conditioning systems for the new ocean liner, the "S. S. United States", I feel compelled to call attention to an error in the August HPAC.

An item on page 74 reads in part, "engineers who designed and built the 60-odd huge turbo 'Freon' refrigeration compressors for cooling the queen of the American merchant fleet [said] there is sufficient cooling aboard to air condition more than 800 average size homes."

Actually, there are only six 'huge turbo refrigeration compressors' which supply refrigeration for a chilled water system — which, in turn, supplies the air conditioning for the ship. There are, however, 60-odd air conditioning systems serving the ship, each system consisting of fans, chilled water cooling coils, heaters, filters, necessary duct work, terminals, and controls. — D'ARCY E. PHILLIPS.

NPA ALLOTS FOR $121 MILLION PROJECTS

ALLOTMENTS OF controlled materials for the construction of 162 commercial, religious, municipal and entertainment projects to cost more than $121 million were announced last month by the National Production Authority.

Most of these allotments, which call for delivery of materials in the third and fourth quarters of 1952 or in subsequent quarters, were made just prior to the steel strike, NPA said.

In accordance with recently announced criteria for processing construction applications, NPA pointed out, approved projects on which construction has not started may have to be deferred until 1953.

Any fourth quarter allotment, however, will be valid for deliveries of materials scheduled through February 1953.

A project breakdown of the newly announced allotments shows 21 office buildings with an estimated cost of $47.7 million, and 49 retail stores to cost $44.8, leading the list.

Central Coolant Piping

. . . . . : system at De Soto engine plant found to have many advantages

By James C. Bishop
De Soto Div., Chrysler Corp.

WHEN THE NEW De Soto engine plant in the Detroit area was being planned, it was decided to incorporate a central coolant system, which is an important factor in making this plant one of the most modern and best equipped in the industry.

Automatic production tools are usually equipped with a self-contained coolant system, which includes a reservoir for the coolant, a coolant pump, piping and nozzles for flooding the cutting tools or grinding wheels with coolant. After several hours of operation, the reservoir becomes filled with grindings or chips and the coolant becomes too dirty to be effective, as dirty coolant causes "loading" of grinding wheels and burning of tools — which affect finished surfaces.

When this condition develops, the machines have to be cleaned out and their reservoirs recharged with fresh coolant. The cleaning and changing of coolant necessitates a down-time of about 40 minutes for each machine. If each machine were serviced only ½ hr every two days, the production lost becomes an expensive item — not to mention the hand labor involved.

The Chrysler Corp. engineering division suggested that if the coolant were kept clean and aerated, its life would be almost indefinite.

Advantages of a Central Coolant System

A complete central coolant system provides the following advantages:

1.) Eliminates down-time due to machine cleaning, thus increasing production.

2.) Increases tool and grinding wheel life.

3.) Shortens down-time due to frequently changing tools.

4.) Provides more sanitary working conditions for machine operators.

5.) Eliminates the task of disposing of rancid coolants.

6.) Simplifies the task of handling sludge and chips.

7.) Provides storage for large quantities of soluble oil, so it can be purchased by the tank car.

8.) Provides uniform coolant — that is, constant water to oil ratio.

9.) Improves finish surfaces.

10.) Minimizes stream pollution.

De Soto's plant engineering department set out to design a system which would incorporate these advantages. A tank car unloading station, complete with heater and storage tank and pumps, is installed near the railroad siding. Raw soluble oil is then pumped to a conveniently located mixing room inside the plant. Large quantities of soluble oil and water can be blended and stored in the mixing room. The blend, or coolant mixture, is then pumped to the various coolant systems as required.

Three separate coolant systems were installed. Each system is for a separate machining operation — one for grinding, one for cutting or turning operations on steel, and the third for aluminum turnings.

For simplicity, there were set up two distinct coolant mixtures for the whole plant. A 25 part water to one part soluble oil mixture was set up for all turnings operations. The mixture for grindings is 75 to one.

One of the important factors which influenced design and selection of materials for this project was that the coolant system had to be in operation in six months, which meant all underground work had to be completed inside of three months. The three month schedule was governed by the pouring of the floor so that the machinery could be moved in and placed.

The coolant system for the grinding machines was designed first. There were several such installations which could be observed. Among the pioneers in this field was Chrysler's Plymouth division. These systems were installed under operating conditions, so many desirable features of design were omitted. They did, however, point out the advantages of a central coolant system.

What the Coolant System Comprises

The system comprises a sluice, settling tank, pumps, filter and distribution piping.

The sluice carries grindings from the machines and discharges them into a settling tank. Here, most of the grindings settle to the bottom of the tank and are removed as sludge by a conveyor.

CUTS CLEANING TIME, COOLANT USE

Since this central coolant system was put in operation a year ago, janitor work has been greatly reduced over what would have been required for the same number of machines, if each machine had its own coolant system. There has been practically no cleaning of machines. Instead, the janitors clean the pump screens twice a week and sweep up the department once a day. Although the coolant has not been changed, it is still clean and has retained its fresh odor. The amount of soluble oil used per engine has been reduced. There is no problem of disposing of sludge; instead, the mud-like waste from the settling tank comes out almost dry.

After the settling process, the coolant is pumped to a filter and returned by overhead piping to the various machines. A riser was connected between the overhead main and the nozzle header on the machine. The grindings are drained to the sluice along with the spent coolant as sludge. The individual coolant pumps were removed from the machines and their reservoirs filled with concrete. A velocity channel was troweled in the concrete to facilitate drainage. These channels were sized for velocities of 5 fps to insure drainage of all the grindings. The drain line between the machine and the sluice is black steel pipe, with welded joints for smoothness. (Fig. 1)

A settling tank 5 ft deep by 5 ft wide and 41 ft long is used on the theory that a long shallow tank will provide better settling action than will a deep tank. The settling tank was designed to provide an 8½ minute retention time. In other words, it takes 8½ minutes for the pump to change the contents of the tank. Immediately in front of where the sluice empties into the settling tank, a baffle was provided to localize the turbulence caused by the incoming coolant. Additional baffles were not provided because changes in velocity, due to liquid going under or over a baffle, would disturb the settling action.

A ¾ in. mesh wire basket was installed so that the sluice discharges directly into it, in order to capture any rags or large solids that might be drawn into the pump. A trolley hoist was installed so the basket could be quickly raised and cleaned.

The conveyor was made up of two strands of chain running on sprockets spaced on 4 ft 0 in. centers, with a 3 in. x 3 in. wiper angle installed between the two chains. A steel wear plate was installed on the bottom of the settling tank. The wiper scraping the tank bottom removes the sludge as it settles. Fig. 2 shows the arrangement of the settling tank and the conveyor.

The pumps were arranged so that the reasonably clean coolant would be pumped from the settling tank to the filter. The suction was installed about 1 ft below the water line. For draining the tank, the bottom suction line is used. In case of draining, the sludge is first pumped onto the filter so no grindings will enter the sewers.

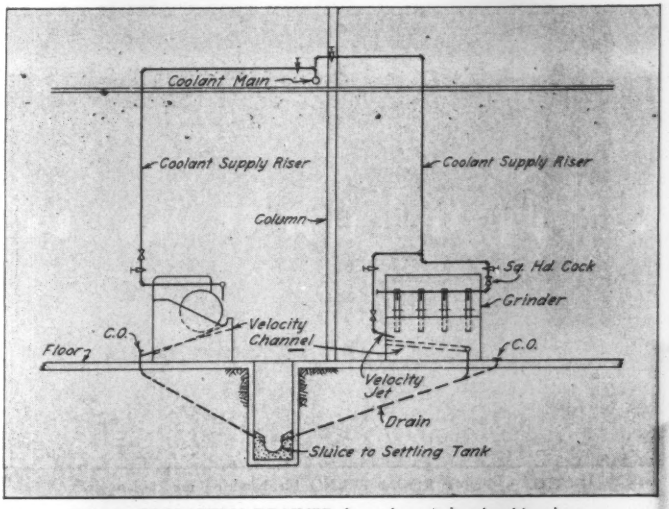


FIG. 1—COOLANT IS DRAINED from the grinders by this scheme

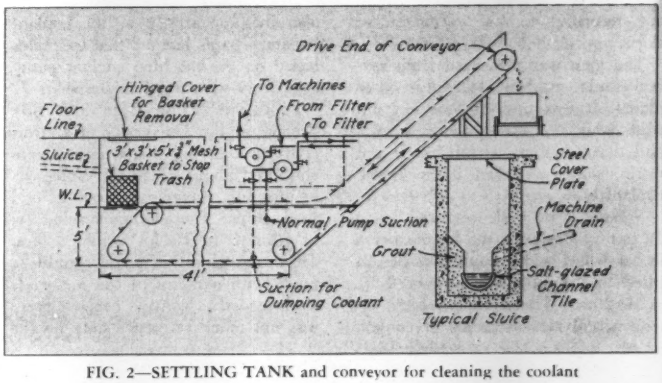


FIG. 2—SETTLING TANK and conveyor for cleaning the coolant

The pumps for the grindings line coolant system are rated at 1000 gpm at 125 ft head. The arrangement of the pump room piping is shown in Fig. 3.

The filtering equipment consists of a sheet of filter paper over which the coolant is pumped. The filter paper lays on an open mesh chain conveyor which is mounted between two 12 in. channels. As the coolant soaks through the filter paper, it is collected in a receiving tank below the filter. Solids contained in the fluid are strained out onto the filter paper. When the pores of the filter paper become clogged, the puddle of coolant lying on top of the paper increases in depth, thus actuating a float which starts the open mesh chain conveyor, causing the solids to be carried over the end of the conveyor into a sludge buggy. At the same time that the sludge is being conveyed into the buggy, fresh filter paper is automatically rolled onto the conveyor.

The filtered coolant is constantly being pumped from the collection tank to the various grinding machines (Fig. 4).

Estimating Required Coolant Quantity

In order to make an estimate of the required gpm, it was necessary to visualize the machine requirements. To this gallonage was added extra coolant necessary for continuously flushing out the machine and inducing sufficient velocity to the drain to prevent settlement. Included in the coolant requirements would be the

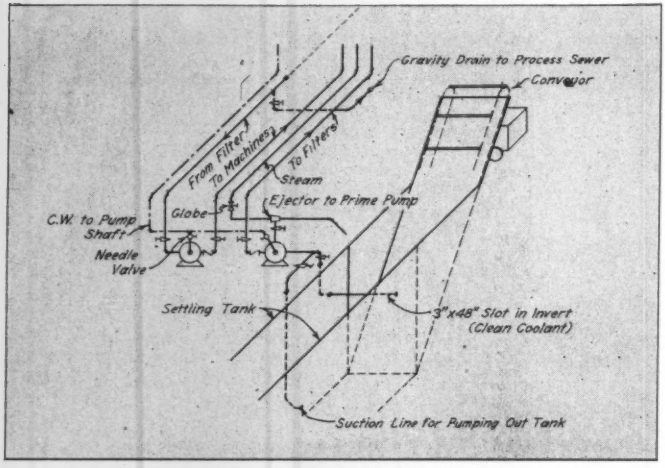


FIG. 3—PUMP ROOM PIPING for handling the coolant

added quantity necessary to induce sufficient velocity to the sluice without resorting to an uneconomical slope.

The gpm was measured from several similar machines located in other plants. It was noticed that a 1 in. wide wheel required about 5 gpm and that machines requiring 5 gpm were usually supplied by a ½ in. coolant line.

Wheels 2 in. wide required 10 to 12 gpm. However, the 5 gpm per 1 in. of wheel width could not be applied to grinding wheels over 2 in. in width. Where inconvenient to take actual measurements of coolant requirements, the number and design of the nozzles were considered and also the appearance of the coolant stream. It was learned that estimates based on the machine coolant pump capacities were very misleading.

Professors Elihu Geer and Roy Bremer of the University of Detroit civil engineering department were consulted about necessary sluice velocities for conveying grindings and steel chips. They thought velocities of from 8 to 10 fps would suffice. They suggested that a test should be made with samples of the materials we intended to convey, because there was not much reference data on the subject. The test results are tabulated in Fig. 5.

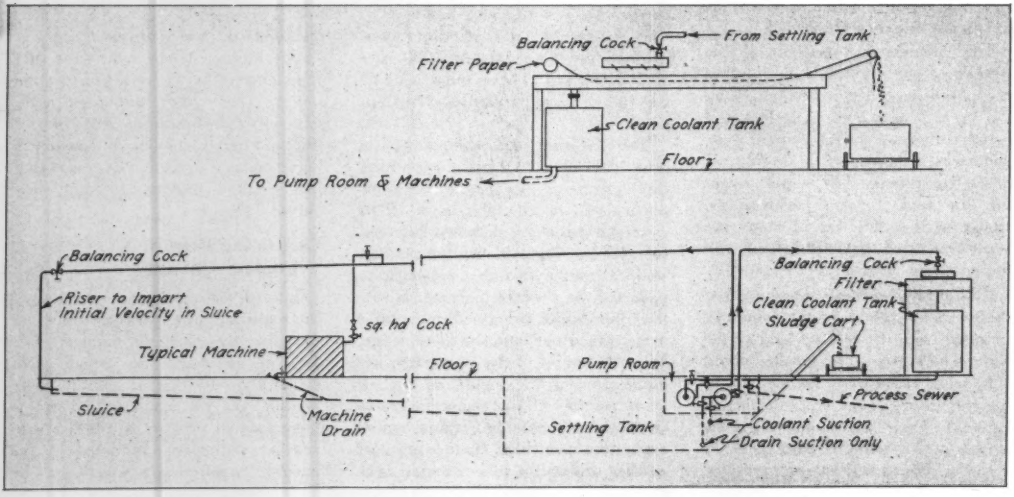
Flow in Channel Tile Tested

During the time that the central coolant system was being designed, steel plate for forming a desirable round bottom sluice could not be delivered soon enough. Machinery had been on order long enough so that it would start to arrive within five months. Due to this, management decreed that the floor be poured in not later than three months.

The velocity experiments indicated that hydraulic conveying of chips and grindings was possible. These experiments were, however, performed with steel sluices and obviously a substitution was indicated. Concrete would provide the desired contours, but it was not impervious to oil. Vitrified salt glazed channel tile was available and it provided the desirable shape and sizes required. The joints could be made with plastic cement, which would be impervious to oil. But before using channel crock, a comparative friction test between a steel trough and channel crock, each carrying steel chips, was conducted.

For salt glazed channel tile, 1 pint of chips was deposited on a length of 4 in. channel crock. The crock was brushed reasonably smooth with a wire brush and its invert kept wet with dripping water to simulate a sluice, as indicated in Fig. 6. One end

FIG. 4—THE GRINDINGS LINE coolant system



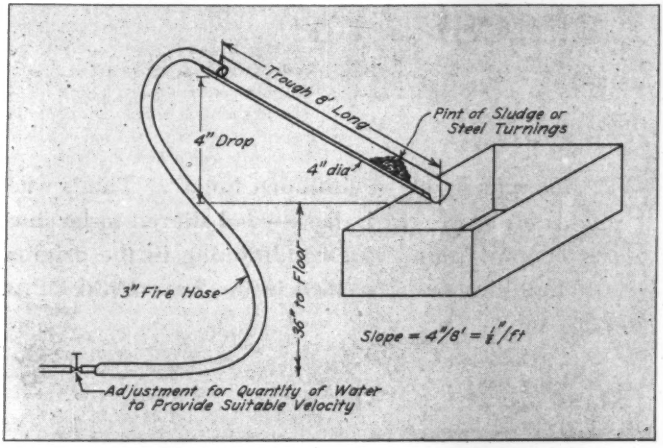

Trough 8' Long
Pint of Sludge or Steel Turnings
4" Drop
4" dia
3" Fire Hose
36" to Floor
Slope = 4"/8' = ½"/ft
Adjustment for Quantity of Water to Provide Suitable Velocity

FIG. 5—TEST WAS CONDUCTED to determine necessary sluice velocities

Sample of very liquid sludge flowing freely but precipating ..... Water velocity = 3.33 fps.
Pint of sludge starting to break up and move ..... Water velocity = 5.3 fps.
Pint of sludge moving freely ..... Water velocity = 6 2/3 fps.
Random turnings
Large chip weighing 1.25 oz beginning to move ..... Water velocity = 3.33 fps.
Large chip moving uniformly ..... Water velocity = 4.4 fps.
Large chip moving rapidly ..... Water velocity = 6.66 fps.
Pint of heavy chips moving rapidly ..... Water velocity = 6.66 fps.
The velocities were measured by dropping a wooden chip in the water and timing its speed with a stop watch. Velocities were varied by adjusting the amount of water.

of the crock was elevated until the chips started to move. Several tests were made, and the tangent of the angle of repose noted. The same procedure was repeated with a steel trough. The tangent of the angle of repose is equal to the coefficient of friction.

Tan ϕ for 4 in. vitrified channel crock 0.45
Tan ϕ for 4 in. steel trough .. 0.38

Strange as it seemed, the coefficients of sliding friction and static friction were about the same. Possibly this can be explained by the behavior of some types of steel turnings. The pile of chips does not disintegrate when it starts to move. Rather, if the chips do start to break up and move, they don't go far before they stop and bunch up again. To keep uniform velocity, the angle overcoming static friction seemed to be the one that was best to use.

Both the velocity and the friction tests were, admittedly, crude and probably not very exact. The velocity test with the steel trough indicated a velocity of 6 2/3 fps as satisfactory. Friction tests indicated that if the crock were laid with care it would do about as good a job as formed steel, provided the velocity was increased enough to compensate for the small frictional difference.

Professor Geer suggested that carrying power would vary as the sixth power of the velocity*. Stated in the form of an equation, it would be:

$$(6.66^6/X^6) = (0.38/0.45)$$

where X = new velocity for a crock sluice and 6.66 = velocity for steel sluice.

Solving this equation, X was determined as 6.85 fps.

From a hydraulic standpoint, the most efficient cross section for an open channel is one holding the most water and having the smallest wetted perimeter.

For the final sluice design, the Manning formula was used:

$$V = (1.486/n)(r)^{2/3}(S)^{1/2}$$

where V = velocity fps; n = an empirical measure of the surface characteristics of the inside of the sluice that is in contact with the flow (taken as 0.012, representing well-laid vitrified crock); S = slope of the hydraulic gradient; r = hydraulic radius = area of the wetted cross section, sq ft, divided by the wetted perimeter, (r for a pipe running half-full is $D/4$, if the diameter D is expressed in ft).

A table was worked up to show various combinations of slope, channel size, coolant quantities and resulting velocity. From this table we were able to select the most economical design. The slope was governed by the length of the sluice. Where the sluices were close to column footings, it was sometimes reasonable to go to a less critical slope, and instead, use more coolant. Where

*See page 12, Applied Soil Mechanics, by Wm. S. Honsel, Edwards Bros., 1938.

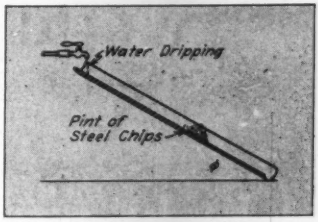


FIG. 6—A TEST WAS ALSO run to determine the effect of using salt glazed channel tile instead of steel for the trough

sluices were short, a steeper slope was used and, therefore, less coolant.

There are, of course, other formulas which can be used equally well, such as Kutters. Due to the trial and error involved in the sluice design, a graph of the Kutter formula saved a lot of time. The final sluice design was mathematically checked with the Manning formula.

Care was exercised in the field when the sluices were formed. It was important that the slope be uniform and that inverts at joints be even. Drains from machines enter the sluice on a long radius turn in the direction of flow and the invert of the drain was kept to within 4 in. above the sluice water line so as not to disturb the flow in the sluice. In general, anything that would cause a hydraulic jump was avoided.

Piping was designed for a pressure drop of 11 ft per 100 ft. There was no problem due to internal corrosion and deposits because the coolant itself is intended to prevent rust. Design was based on clean, new pipe in good condition. Branches were taken off the top of the main to discourage the branches from draining when the pumps are shut down.

Branches were sized so there would be a back pressure of 20 lb at the square head cock in the supply riser to the machine. The cock is usually throttled, so that by the time the coolant travels through the machine distribution piping its pressure is about spent, thus avoiding splash. By referring to the pump curve the cock can be adjusted so that the pumps handle approximately the desired gallonage.

Valves 3 in. and over are iron body, brass trim, flanged and OS&Y pattern. Valves under 3 in. are screwed pattern, rising stem. Check valves are furnished with oil resistant composition seats.

"World's Largest . . .

. . . completely air conditioned hotel". That's what the Adolphus — in Dallas — is believed to be since completion of its new addition. Air conditioning in the original building was described in the June 1936 HPAC

By H. J. Lohrman

Wyatt C. Hedrick
Architect & Engineer

WITH THE COMPLETION of its new 20 story wing, the Hotel Adolphus in Dallas became "the largest completely air conditioned hotel in the world."

The new addition, consisting entirely of guest rooms, was built on top of the previously existing Main St. arcade. It begins at the sixth floor level (actually three stories above the street) and its roof is at the 26th floor level. From the roof, a brick walled enclosure rises another two stories for almost the length of the wing; this enclosure contains the new five cell induced draft cooling tower for the entire refrigerating plant of the hotel (approximately 1250 tons of refrigeration).

23,000 Cfm Primary Air at 8 In. Pressure

The air conditioning for the new addition is of the type generally called a conduit system. It is a conventional representative of its type, utilizing a relatively small quantity of primary air which is chilled, dehumidified and pressurized to a greater extent than supply air for the usual air conditioning system. This primary air is distributed through round ducts (or conduits) and is introduced into each room through a specialized outlet cabinet under each window. The primary air reduces room moisture content and furnishes a portion of the sensible cooling. It is discharged through jets in an outlet box in the base of the cabinet unit into a venturi section, where it induces room air movement through a secondary coil — which furnishes the remainder of the sensible cooling.

Under ordinary conditions no dehumidification takes place within the window unit. The primary air is all outside air, which is drawn through an eight-row sprayed coil dehumidifier located on the roof, reheated according to an outside temperature schedule and forced into the downfeed round ducts which supply the window units. The primary air fan handles 23,000 cfm at 8 in. of water static pressure.

A somewhat unusual feature of this primary system is the use of rectangular header ductwork instead of round header conduit furred in the ceiling of the 26th floor. This ductwork, necessitated by building structural clearances, is constructed with welded seams and is braced with welded angles to prevent buffeting or drumming under pressure fluctuations.

After performing its cooling function in the guest rooms, most of the primary air is exhausted through the bathroom exhaust stacks. There are 460 rooms in the new wing, each with a bath having an exhaust outlet. Some 15,000 cfm of air is exhausted in this way.

Piping Partly Tunnelled Through Rock

The dehumidifying coils of the primary unit on the roof are supplied with approximately 480 gpm of water at 42 F pumped directly from the chiller of a new 250 ton centrifugal refrigeration compressor installed in the main boiler room adjacent to the previously existing refrigeration equipment. This location was selected mainly to retain centralized operation of all the large refrigeration compressors for the hotel, although certain physical problems of installation were introduced by the selection.

Due to the fact that the new wing is some distance away from the boiler room, and that all existing piping routes were used to their full capacity, it was necessary to create a new route — in part, by tunneling through rock. Luckily the extensive rock excavations necessary for the structural foundation of the new building provided an almost ready-made solution to the tunnel problem.

All other components of the mechanical plant, which are set up for operation with a minimum of attention, are located in a small basement space under the new wing. The installation of pumps and heat exchangers under the new building is one of the most compact arrangements of piping and equipment imaginable — yet all equipment is easily accessible for maintenance. Chilled water for the secondary coils of the window units is supplied by pumps in the latter group of equipment.

Secondary System Divided Into Two Zones

The secondary system is divided into two zones for east and west ex-

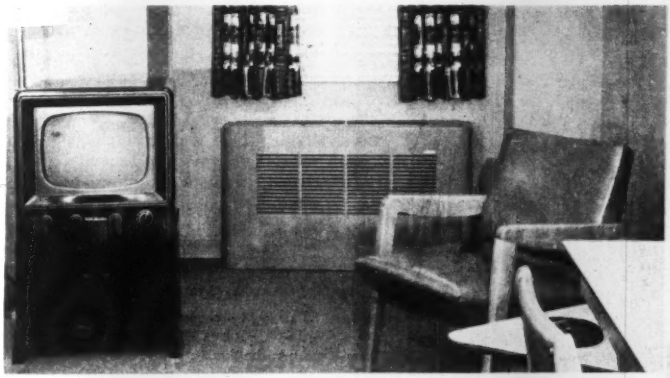
posure. Return water from the primary dehumidifier is picked up by the secondary pumps, mixed with secondary return water to the required zone supply temperature, and circulated to the units. The supply temperature for each zone is controlled by a solar box thermostat high on an outside wall of the building. These zone master thermostats reset the control points of the submaster thermostats which regulate the water temperature through chilled water mixing valves on cooling, and through control of steam valves to the heat exchangers for winter operation.

Steam for comfort heating and all other services is provided by the boilers of the original hotel, which still have considerable reserve capacity. The boilers are in year 'round operation for supplying process steam to the laundry and kitchen, as well as steam for domestic hot water. Boiler steam is generated at a pressure of 100 psi gage, and distributed generally at that pressure. It is run through reducing stations supplying risers which feed the heating coils in air handling equipment of the original hotel.

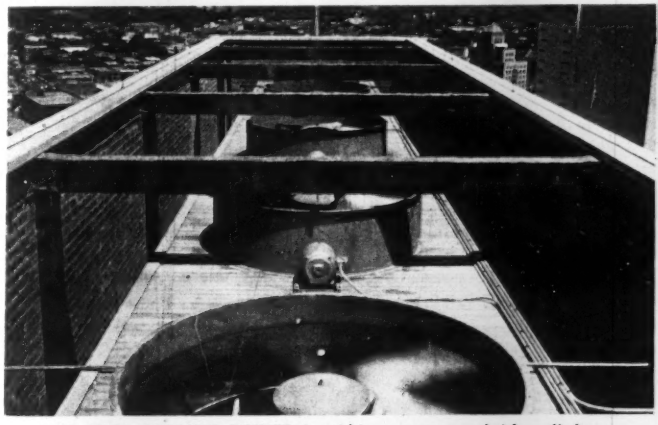
A source of low pressure steam for the tempering and reheating coils of the primary dehumidifier of the new system was found in the large riser which had supplied the old window radiation of the original hotel. The window radiation had been disconnected some time previously. It was found practical to take a small high-pressure line into the basement under the new wing to feed secondary heat exchangers of the new system. For each exchanger, parallel valves under thermostatic control were used to prevent inaccuracy and wiredrawing in low capacity operation.

Need Some Conditioning at 55 F Outside

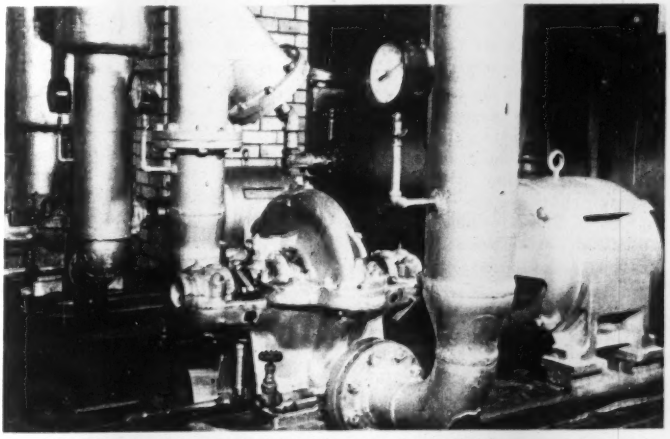
The air conditioning and refrigeration system of the original hotel is quite complex. The total system capacity before the addition of the new wing was approximately 1000 tons of refrigeration. Air conditioning refrigeration accounts for 895 tons; the remaining 105 tons is divided among a number of small reciprocating "Freon" and ammonia compressors which handle cold storage vaults and ice machines and which also chill brine for circulation to the freezing coils in the Century Room skating floor. The air condi-



PRIMARY AIR distributed through round ducts is introduced to each room through a specialized outlet cabinet under each window



THE NEW COOLING TOWER is within a two story, brick walled enclosure on top of the addition. Its installation was carefully scheduled



REFRIGERATION FOR COMFORT cooling is supplied by means of two distinct systems furnishing chilled water to air handling units. Photo shows some of the new chilled water and condenser water pumps

THE NEW ADDITION — consisting entirely of guest rooms — was built on top of the previously existing Main St. arcade

tioning load is distributed over some 900 guest rooms, and includes numerous "spot loads" such as the lobby, the Century Room, the grand ballroom and more than a dozen other public or semi-public assembly spaces.

It is interesting to note that whenever the outside temperature exceeds 55 F, it becomes desirable to supply air conditioning refrigeration for some of the spot loads. All comfort cooling in the original hotel is done by means of conventional duct systems, with air handling units centrally located on each floor of each wing. Many of the "spot loads" are handled by built-up units with provisions for reheating the dehumidified air for temperature control.

Refrigeration for the comfort cooling is supplied by means of two distinct systems furnishing chilled water to air handling units in separate wings of the building. One of these systems — one of the first of its capacity in Dallas — consists of two centrifugal "Freon" compressors, of 365 tons and 170 tons capacity respectively. The chillers and condensers are piped in parallel, with a single large pump for each water service and a standby pump so arranged that it can replace either of the prime pumps temporarily. Condenser water piping for the two units was combined into a single 8 in. supply and 8 in. return line and of necessity routed rather tortuously through existing bundles of steam pipe, ventilation shafts and ductwork to a cooling tower on the low roof of the old Main St. arcade.

Refrigeration for the second system — installed during 1949 — is supplied by a single centrifugal compressor of 360 ton capacity. The chilled water circuit of this unit is separated from that of the older system, but connections are provided in the boiler room for emergency cross-operation of the two systems. When the second system was installed, the two condenser water lines of the older system were converted into parallel supply lines to the tower and a larger return line was installed to carry the flow of both systems. At the time the new addition was designed, this condenser water system was operating successfully with the two large pumps and several smaller pumps paralleled. The system carried some 3000 gpm of water with an average pumping head of about 140 ft of water.

New Wing Presented Unusual Design Problems

From the beginning, the project of providing a new wing presented many unusual design problems. The original hotel contained an adequate number of large guest rooms and luxury suites; however, a shortage existed in the smaller commercial single room category. The space available for the new wing was limited to an area approximately 50 ft wide by 110 ft long. Accordingly, the new addition was designed compactly for maximum space economy — both horizontally and vertically. The object was to obtain the greatest possible number of rooms adequate in size but wasting no space. It was required that room space to be occupied by air conditioning equipment, duct and pipe chases and the like be restricted to the absolute minimum. The roof of the Main St. arcade, which would become the sixth floor of the new wing, was occupied by the cooling towers for the existing building. It was also the location of fans and duct terminals for the indispensable kitchen and boiler room ventilation of the existing hotel.

Kitchen Supply Air Cooled Evaporatively

In conjunction with the new addition, it was necessary to replace the existing kitchen supply and exhaust ventilation fans. As the job developed, it was decided that (in addition) the entire system of kitchen ducts should be replaced. The new fans were located in a mezzanine equipment room just under the sixth floor of the new wing. Handling some 18,000 cfm each, they provide approximately a 1½ minute air change for the kitchen. The supply air is passed through an evaporative cooler in summer. By locating new exhaust hoods at the points of heat and steam origination, considerable improvement of working conditions in the kitchen has been effected.

Cooling Tower Installation Carefully Scheduled

The problem of locating new condenser water cooling facilities for the existing building was a prime consideration from the early stages of the project. The existing towers were two in number, one a side inlet forced draft tower of approximately 850 tons capacity and the other a new single cell top outlet induced draft tower of approximately 150 tons capacity. It was necessary not only to select a new location for any large replacement tower, but to time the dismantling of the old tower and the completion of the new one to cover the off-season period for air conditioning.

Obviously, construction of the new wing was dependent on removal of the old tower. Possible locations for the tower were scarce. One space was available on the roof of the existing building, but consideration of structural factors and the expense of re-routing large condenser water lines through 17 existing floors dictated against this location.

It was finally decided that all condenser water cooling would be combined in a single large tower, for new and existing refrigeration plants. The schedule of planning and building erection was such that the time between dismantling the old tower and scheduled completion of the new steel structure fell within the winter season.

An investigation had been made of the existing condenser water pumps and their suitability for operation under an added 200 ft of water submersion. In view of the involved nature of the system within the existing building, it was decided to let this system alone. The existing lines

were connected into generously sized 14 in. trunk risers at the new sixth floor level where they were joined by the piping from the pump serving the new addition. Calculations indicating that all existing large pumps would perform satisfactorily under the new conditions were verified by the operation of the system. New pumping heads were the same or slightly less than original heads.

After further consideration of ways and means of handling the marginal 100 tons or so of refrigeration which would be absolutely necessary all winter, it was decided to lease space on the roof of a neighboring building and move the smaller existing tower to that location temporarily. Construction of the steel skeleton of the building was actually completed and the cooling tower base made available around the middle of June 1951. Extension of the condenser water lines had been pushed up closely behind the structural steel. Since the lack of cooling was beginning to present a considerable rental and operational problem to the hotel management, the erection of the tower and completion of the condenser water system were performed on a 24 hr basis. The work was completed in 10 days, and the cooling tower was put into operation to serve the main building more than six months earlier than the general completion of the new addition.

The Hotel Adolphus is owned by the Dallas Hotel Co., of which Leo F. Corrigan, Sr., is president.

The general contractor on the addition was the Henry C. Beck Co., and the mechanical contractor was the C. Wallace Plumbing Co.

[The photos reproduced with this article were taken by Fuad T. Saadeh, of the Wyatt C. Hedrick office.]

THREE OF THE contemplated eight buildings in the Gateway Center development, part of Pittsburgh's "Golden Triangle"

"World's Largest"

The first three of the new Gateway Center buildings in Pittsburgh represent "the world's largest commercial air conditioning installation"

THE "WORLD'S LARGEST commercial air conditioning installation" was dedicated in the new Gateway Center buildings, Pittsburgh, on July 30 with a prediction that air conditioning this year has entered its period of greatest growth. Cloud Wampler, president of Carrier Corp., predicted that total consumer sales — which last year topped $1 billion — will more than double during the next decade.

"Current unprecedented demand for home and industrial air conditioning should lift the industry's 1952 sales by at least $100 million over last year," he said. "By 1962 I foresee annual consumer sales in excess of $2.3 billion and still continuing upward."

The dedication of the 4500 hp sys-

tem which will cool a total of 64 floors in the first three buildings of the Gateway Center development took place on the 50th anniversary of the first air conditioning installation by Dr. Willis H. Carrier, in July 1902. Mr. Wampler spoke before industrial and civic leaders of Pittsburgh who were present as guests of Carrier Corp. and of The Equitable Life Assurance Society of the United States, owner of the Gateway Center buildings.

Mr. Wampler pointed out that the modern American city — such as Pittsburgh with its remarkable $1.5 billion revamping program — requires air conditioning as one of its attributes. He said:

"Pittsburgh businessmen, by their vision and planning, have pulled this city up by its economic bootstraps from a declining metropolis to one of the most modern of today's American cities.

"The faces of other now prosperous American cities must be completely changed if they are to meet the increasing public insistence on modern facilities. If this is not done, those cities will move backward instead of forward. They might well take a leaf from Pittsburgh's reconstruction book.

"Air conditioning is one of those modern facilities on which business and industry are more and more insisting. For example, no major building in New York City since the war has been constructed without complete air conditioning.

Commercial Air Conditioning Economic Necessity

"This commercial air conditioning is not a luxury, but an economic necessity," he said, referring to a recent survey in New York City which showed that during the excessively hot weather this summer more than 60 percent of the firms checked had closed their businesses from one to three hours early. "When you consider that many thousands of employees were involved in these companies alone, the dollars and cents value of air conditioning is dramatically underscored. But what is not so obvious is the economic loss through impaired efficiency when employees remain on the job in hot summer weather."

The first three buildings of the eight comprising the Gateway Center development which will rise at the merging of the Allegheny and Monongahela rivers are the most visible part of Pittsburgh's reconstruction program. One is 24 stories and the other two are 20 stories each. For the total of 64 floors of space, an installation of 6013 individual room units was required. Three centrifugal compressor machines in the basement of one of the buildings provide 4500 tons of cooling.

The air conditioning system was engineered so that no mechanical equipment is needed between the basement and the penthouses in any of the buildings, thereby freeing space for office occupancy. Fifteen miles of small circular ducts, or conduits, in the walls of the buildings carry the conditioned air under pressure at high velocities to all outside rooms. The conduits and ducts range from 3 in. to 36 in. in diameter.

Air is cleaned and filtered as it is drawn into the system through 30 sets of electrostatic filters. A total of 12 high pressure fans ranging from 6 to 6¼ ft in diameter and 18 fans ranging from 5½ to 8½ ft in diameter circulate the air through the system at a rate of some 750,000 cfm. A total of 930 hp is required to circulate the air.

The system does not require a cooling tower to conserve water by cooling and re-using it. The system draws water from the nearby Allegheny and pumps it back again after it has been circulated through the refrigeration condensers.

The three centrifugals — among the largest ever made — circulate 7500 gpm of chilled water through the individual room units and the central station air conditioning equipment.

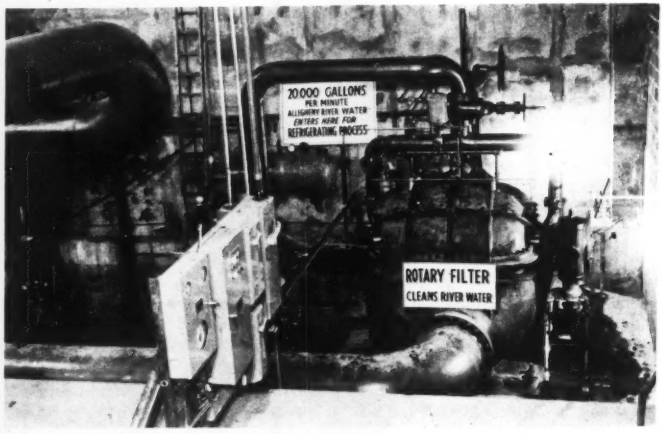
Coils 17 miles in length in the central station apparatus dehumidify and cool or heat the air being sent to these individual office units.

72 Miles of Chilled and Warm Water Piping

Seventy-two miles of piping provide chilled or warm water to the 6013 units to permit individual thermostat control of temperature in each area. It was partially because the buildings are built in the form of a huge cross, with exposures on all sides and a constantly changing pattern of moving shadows, that the automatically controlled conduit system was selected to provide spot control of inside temperatures. The unit outlets are built in as part of the wall of the building under the windows, facilitating the rearrangement of partitions as physical requirements change.

Kerby Saunders, Inc. was the mechanical contractor. Meyer, Strong and Jones served as consulting engineers for mechanical equipment. The architects were Irwin Clavan, and Eggers and Higgins. Starrett Bros. & Eken, Inc. were the builders.

ALLEGHENY RIVER WATER is used for condensing in the Gateway Center air conditioning equipment



Code for Pressure Piping

FROM TIME TO time, reports of certain actions of the Sectional Committee B31 on the ASA Code for Pressure Piping, sponsored by The American Society of Mechanical Engineers, are issued for the information of interested parties. While these do not constitute formal revision of the Code, they may be utilized in specifications, or otherwise, as representing the considered opinion of the Committee.

Pending revision of the Code for Pressure Piping, ASA B31.1-1951, the Sectional Committee has recommended that selected interpretations be published so that industry may take immediate advantage of corresponding proposed revisions.

Cases 10, 11 and 12 are given here and are reprinted from the August 1952 issue of *Mechanical Engineering* by special permission of the publisher, The American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N.Y. Cases 6, 7, 8 and 9 appeared in the October 1951 HPAC, and Case 5 in the August 1951 HPAC. Cases 1 to 4, issued prior to the latest revision of the Code, have been annulled.

Case No. 10

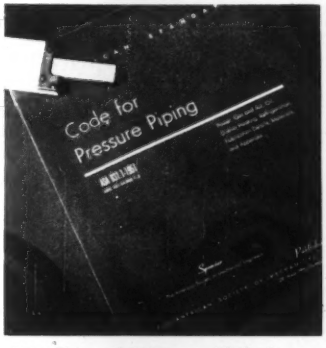
Inquiry: May blind flanges be made from steel plate material as well as from forged or cast materials now permitted by the Code?

Reply: It is the opinion of the Committee that blind flanges may be fabricated directly from plate materials with mechanical properties equal to or better than the permissible forged materials. Flanges on which welding may be required should also be of weldable quality.

Case No. 11

Inquiry: May austenitic chromium-nickel alloy steels which are stabilized with columbium plus tantalum be used under Code rules which are applicable to the use of stainless steel Types 309 Cb, 316 Cb, and 347?

Reply: It is the opinion of the Committee that austenitic chromium-nickel alloy steels, which are stabilized with columbium plus tantalum instead of columbium only, may be used under Code rules which are applicable to the use of Types 309 Cb,



316 Cb, and 347 provided the requirements of the emergency alternate provisions of ASTM Specification A312 are met, except that the requirements for columbium contents shall be as follows:

Columbium: Determination not required
Columbium plus tantalum: 1.25 percent max. or 8 x the carbon content, min.

Until such time as the NPA regulations are cancelled, these steels stabilized with columbium alone may be used with a minimum columbium content of eight times the carbon content. Working stresses shall be the same as those listed for the standard grades stabilized with columbium alone.

Case No. 12

Inquiry: Pending issuance of emergency alternate specifications by the American Society for Testing Materials to provide for conservation of critical alloying material, may the molybdenum content of specifications referred to in the Code be lowered by 0.05 percent?

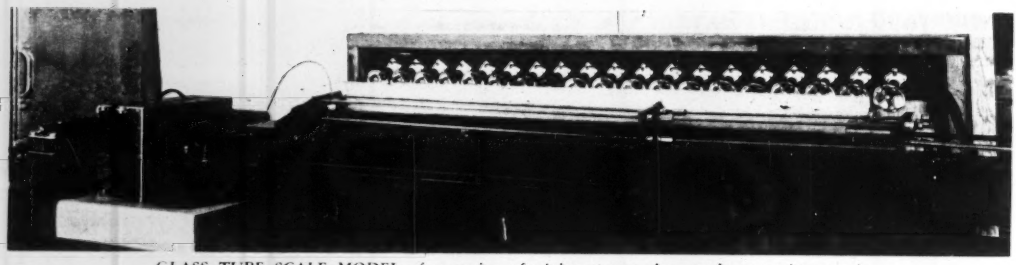
Reply: It is the opinion of the Committee that the intent of the Code will be met if specifications with a molybdenum range of 0.45 to 0.65 percent are reduced to 0.40 to 0.60 percent, and specifications with a range of 0.90 to 1.10 percent are reduced to 0.80 to 1.00 percent. The allowable stresses assigned to these respective grades need not be reduced.

* * *

Safe sidewalk: Pedestrians won't slip on the sidewalk in front of the William Penn hotel in Pittsburgh this winter. The new heated walk will go into operation the first time the sidewalk temperature falls to 37 deg, according to the Zonolite Co., producer of vermiculite. The base of the walk consists of roofing felt. Over it is a 1½ in. thickness of vermiculite concrete. Topping this is building paper, on which hot water pipes rest. A wire mesh covers the pipes and a 1¼ in. non-skid topping forms the walking surface. The vermiculite concrete (concrete with vermiculite aggregate instead of sand) prevents excessive loss of heat downward and directs the heat up.

* * *

Highest peak: Sales of the Westinghouse Electric Corp. in the first half and in the second quarter of 1952 set new records, and the backlog of unfilled orders is at the highest peak in the company's history, President Gwilym A. Price reported at a recent meeting of the board of directors. Net sales billed in the first half of 1952 were $681,378,000, compared with $590,562,000 in the first half of 1951. The previous record for any half year was $650,239,000 in the second half of 1951.



GLASS TUBE SCALE MODEL of a section of piping was used to study water hammer in steam mains. Means of preventing the terrific pressures caused by water hammer will be future aim of the work

What's Status of District Steam?

NDHA Sees Improved Competitive Position, Need for Lower Piping Costs, Wider Applications (including use of summer steam for air conditioning, and steam for snow melting)

By John F. Collins, Jr.
Secretary-Treasurer
National District Heating Association

ARE DISTRICT HEATING distribution facilities being built better than they need be? This question was raised by William C. Kaber, of the Union Electric Co. of Missouri, St. Louis, in his paper on steam extension costs vs. revenue, given at the 43rd annual meeting of the National District Heating Association.

He expressed the opinion that the continual increase in cost of extending lines is the biggest problem now faced by the industry, and he proposed that the distribution committee of NDHA be directed to bend every effort to find suitable but less expensive steam piping installation methods.

Competitive conditions have changed in the last two decades. In 1934, R. J. J. Tennant — then of the Pittsburgh steam utility — said that outstanding factors in meeting competition from private plants were the low price of fuel and of operating labor, the rapid advance in the design of small stokers, the interest and cooperation of kindred industries backing the sale of such equipment, and "a total disregard of the intangible advantages" of purchased steam service. The prospect tended to discredit the statements of utility representatives and the public looked with doubt on the security of utility operation.

In his paper on competition presented this year, Norman H. Davidson, of the Rochester (N.Y.) Gas and Electric Corp., chairman of the NDHA sales development committee, quoted Mr. Tennant's statement of another day and he stated that now this is all changed. Private plant costs generally have increased more rapidly than steam rates, he said. The rates, including coal cost adjustments, have increased less than 50 percent, while costs of many items in private plant operation (such as the big ones — fuel and labor) have more than doubled. Private plants now have trouble in securing reliable and competent labor. They have trouble operating under, and must make additional investments to comply with, the new anti-smoke ordinances. With the results of 20 years' operations placed before them, prospective customers nowadays are willing to credit statements made by utilities and to evaluate the intangible advantages of the service, he stated.

Mr. Davidson gave statistics on competitive fuels in 13 cities and illustrated by four examples the nature of present private plant competition.

Supplying Summer Steam for Air Conditioning

One of the newer phases of the district steam business — which arouses a great deal of interest and speculation as to its future — is summer air conditioning with steam. The utilities furnishing service are interested because it is in the summer months — when their steam systems have ample capacity to fill the demand — that steam is required. They will have little if any capital expenditure to make. The annual steam use of a building for cooling may be almost as much as for heating it in winter.

Several years ago, the NDHA established an air conditioning committee with Robert D. Martin, vice president of the New York Steam Corp., as its chairman. Sufficient installations have since been made and enough data have been compiled so that the steam quantities and costs can be accurately estimated for prospective customers. The committee produced three papers on the subject for this year's meeting.

In the first of these, Wirt Scott, engineer with the Philadelphia Electric Co., explained in detail how operating costs for both the absorption and the mechanical refrigeration systems may be computed and compared. He pointed out that there are several methods of approach, depending on the use to be made of the report.

In the second paper, on the economics of steam vs. electric refrigeration for typical office buildings, E. L. Shulz, of the Carrier Corp., Pittsburgh, pointed out that selection is usually based on (1) the cost of ownership, the items included being amortization, interest, taxes, insurance and loss of rentable area; and (2) the cost of operation, the items included being electricity, steam, water and labor. The cost of steam must be reasonably competitive with electric and gas rates if the absorption refrigeration machine is to be the choice for air conditioning a building. He listed seven features of a recently designed absorption machine which have resulted in its favorable reception.

Experience with a 1500 ton, steam operated, air conditioning system in the 38 story office building known as 100 Park Ave. — in New York City — was the subject of the third paper. It was written by James H. Morrow, building manager. Mr. Morrow described the building and its air conditioning system. The main refrigeration plant comprises two 1000 ton centrifugal compressors driven by two 1150 hp turbines taking steam from the lines of the New York Steam Corp. at 150 psi.

In giving the actual quantity of steam used during the first year, Mr. Morrow commented that most engineers (when estimating) have a tendency to overlook the large quantity of steam required for reheat during the cooling cycle. He said that they expected to reduce the operating quantities of the first year in future years.

Mr. Morrow summarized the advantages of steam operated air conditioning equipment as: (1) Low summer steam rates. (2) Absence of a demand penalty, such as electrical equipment would incur. (3) Simple, effective control at all speeds. (4) Reduction of noise and maintenance due to direct connection of turbine to compressor without gearing. (5) Reduction in building cost because a smaller electrical distribution system is required. (6) Reduction of first cost and maintenance because of less starting equipment.

Air conditioning systems installed so recently in three New York buildings that no operating statistics are available, were described by Henry J. Cushing, of the New York Steam Corp.

The chief climatologist of the U. S. Weather Bureau, Herbert C. S. Thom, Washington, D. C. spoke on the commercial relations committee program on seasonal degree-day statistics for the United States. His treatment of the subject was somewhat different from the usual one in which emphasis is put on mean and maximum values, and was very enlightening. He pointed out a weakness in mean figures in that they are exceeded as many times as not. If, for example, mean degree-days are used to decide annual coal purchases, they will be low half the time. Mr. Thom gave formulas by which, for example, from the mean annual degree-days, the number of degree-days that would be exceeded only once in 20 years on the average could be computed. Such figures, used instead of maximums as a basis for design, would save capital investment.

In his paper on baseboard heating, Roger A. Parsons, heating engineer with the Lansing, Mich., board of water and electric light commissioners, gave the results of his observations of the successful operation of a 160,000 Btu per hr hot water heating circuit in a Lansing building. Since a number of manufacturers recommend circuits of no more than 80,000 Btu per hr and as long circuits have certain advantages, Mr. Parsons feels the maximum capabilities of such systems deserve wider recognition. D. F. Bennett, of Warren Webster Co., agreed that a higher capacity than present practice provides is a good idea if water velocities are held within the acceptable range.

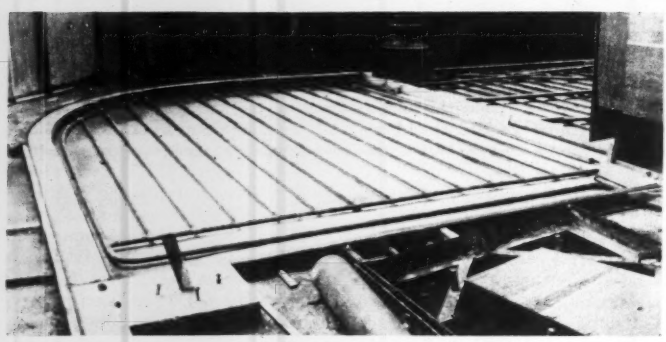
Reports on Experience in Snow Melting

Concluding the commercial relations program, present practices in the design of snow melting systems were discussed by John L. McKinley, of the Public Service Co. of Colorado, Denver. He said that there is no preference between sinuous coils and pipe grids. They are generally of ferrous pipe. Antifreeze solutions are most often used in the systems but oil as well as steam, returned condensate and hot water also have been employed. Insulation below the coils is justified only when the space under the coils is occupied or when the coils are above grade. The cost of installation lies between $2 and $3 per sq ft of heated surface, exclusive of expenditures for subsurface insulation and repaving, he said.

Relatively few systems operate continuously throughout the season and few are turned on only when it begins to snow. The favored control keeps the solution at a set temperature and a hand switch starts the circulating pump when needed.

Seventy percent of the systems are two years or less old and not much operating information is available.

After describing some of the varying characteristics of snow fall, Mr. McKinley recommended that more attention be given in design to maintaining a surface temperature of 34 F under all design conditions; that ample radiating surface with relatively close pipe spacing be provided; and that a means of raising the temperature of the circulating medium, preferably automatically, be included for use during a snow fall.



CURB-TO-ENTRANCE safety and convenience will be provided patrons of the Home Savings and Loan Association, Chicago, when this new sidewalk snow melting system of embedded wrought iron pipe is put into operation next winter. System was installed as the modern solution to costly snow disposal problems, and for "extra dividends" in improved public and customer relations

The report of the rates and regulations committee, prepared by its chairman, Clifford O. Thurlow, Commonwealth Services, Jackson, Mich., showed that steam rates were increased in 13 communities compared with 11 the previous year. There was one reduction. Block type rates continue to be most commonly used.

Sixty-six percent of the utilities reporting fuel cost adjustment figures for January 1951 and January 1952 show an increase in the unit charge, 13 percent a decrease and 21 percent no change.

On the same program, M. A. Barbour, of The Detroit Edison Co., answered the query, Can the Peak Demand on a Utility Heating System Be Reduced by the Use of a Demand Rate? He showed customers costs under each type of rate, and concluded that most steam utilities doubt the value of demand rates.

Methods of Metering Are Described

A comparative study was made of shunt flow and condensate meters by Richard H. Brown, Rochester (N.Y.) Gas and Electric Corp. By means of case histories, he showed that the choice of the meter type should depend on the nature of the load to be measured. He described several cases of metering losses and explained the corrective actions taken.

Later, Mr. Brown answered questions on the use of inferential-type meters, covering such items as load forecasting, accuracy, testing, correcting, multiple metering, automatic changeover, and variable orifices.

Methods by which his company has successfully used the turbine-type flow meter were described by Vernon J. Suche, Union Electric Co. of Missouri, St. Louis. He showed how, by proper installation methods, accurate measurement may be obtained.

Experience in Pittsburgh since 1928 with shunt flow meters and the changing load type were discussed by Wilbur W. Stevenson, Allegheny County Steam Heating Co. He said that year 'round air conditioning has changed the picture. The steam main running up through a building now may have every conceivable type of load leaving at its branches. Thus a new meter is needed.

In the final paper on the program of the metering committee, Robert C. Wilson, Ohio Edison Co., Akron, explained the methods of installing flow meters in order to obtain accurate measurement under widely varying loads.

Steam Distribution Practices Surveyed

Chairman George K. Saurwein offered three interesting and useful reports on the distribution committee program.

In the first of these, Everett C. Russell, Philadelphia Electric Co., presented the results of a survey of distribution equipment types and practices among 51 steam utilities. Tables for high pressure, combination and low pressure systems included such data as feet of main per customer and per 1000 lb of steam sold; number of expansion joints of the several types; operating cost per ft of main, per customer and per 1000 lb of steam sold; types of traps and pumps; manhole inspections per year; trap overhauls per year; expansion joint lubrications per year; and days worked per week by distribution men.

From the data given, operators of distributions systems can compare their practices with those of other utilities and may find ways to improve them.

Some utilities overhaul traps only when they fail — others do this annually. Some companies lubricate slip-type expansion joints as often as bi-weekly while others apparently use no lubrication. Some inspect manholes daily, others only annually. Of course, there may be special reasons not immediately apparent for these differences in operation but savings should be possible, he said.

Water Hammer Studied in Model

E. E. Dubry and E. T. Smith, of The Detroit Edison Co., made the second annual progress report on their study of water hammer in steam mains.

In order to observe the action of the water, they built a scale model of their test apparatus using a 2 in. heavy wall glass tube 6 ft long. To one end they connected a 30 psi supply connection and to the other a tube similar to a customer's service line taken from a dead-ended street main. A low point in the tube was located about 2 ft from the steam supply end. Instruments to record pressures and photograph the action were included. The tube was half-filled with water at the low point.

The authors observed that slugs form and move along the surface of the water. Their conclusion was that it is not practical to design a piping system to withstand the terrific pressures caused by water hammer, so a means of preventing them will be their future aim.

The analysis of steam distribution systems as regards friction pressure drop and fluid flow by the use of the nonlinear electrical analogy method was explained in a paper by Malcolm S. McIlroy, professor of electrical engineering at Cornell University and consultant to the Standard Electric Time Co., and Chao Kong Chow, graduate student.

This process is a significant aid to engineers who desire to study the performance of steam distribution networks. Comparisons may be made quickly among various plans for constructing a pipe line network. [Note: An article on this method, by Professor McIlroy, was published in the July HPAC.]

Device for Observing Smoke Emission

A device for constantly observing in the boiler water gage mirror the emission of smoke from the stack was described by Walter N. Gillespie, Dayton Power and Light Co., chairman of the NDHA's steam station engineering committee. Mr. Gillespie said the device was simple, reliable and inexpensive and would make it possible to operate soot blowers more satisfactorily.

Developments in the design and operation of cyclone furnaces were explained by Fred G. Ely, consultant, Babcock and Wilcox Co. Mr. Ely said — in listing advantages of this type of furnace — that less work is necessary in preparing coal for burning, that the poorer grades of coal can be used satisfactorily and that less ash is discharged from the stack than with other types of burning equipment. Furnaces of a considerable range of capacities, pressures and temperatures are being operated.

The NDHA meets next in June 1953 at the Lookout Mountain hotel, Chattanooga, when its officers and committees again will report on matters of interest in district heating.

[Mr. Collins summarized other of the reports given at the NDHA meeting in the August HPAC.]

Recommends Method of Making Hartford Loop Connection To Steam Boilers

By E. A. Knab, Heating Contractor
(as told to John E. Hubel)

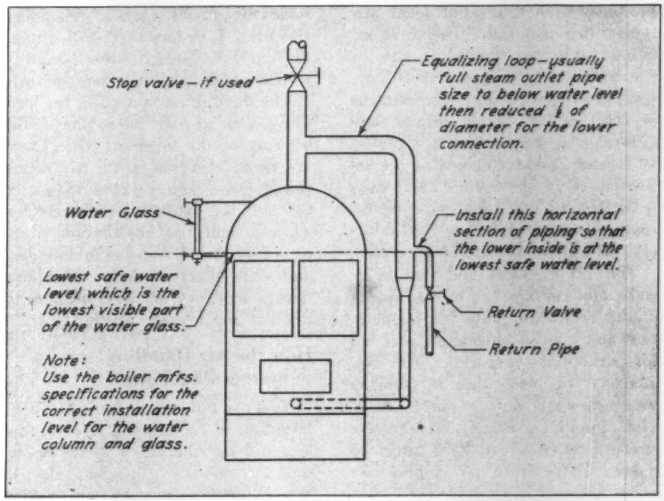
APPROXIMATELY A YEAR ago, contractors in Milwaukee were facing quite a bit of confusion and misunderstanding by virtue of the fact that various state and city inspectors were in disagreement as to the proper Hartford loop design requirements.

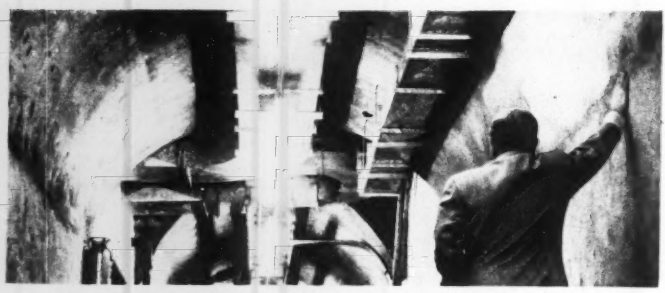
In my position as codes and ordinance chairman of the Heating, Piping & Air Conditioning Contractors Milwaukee Association, it became my duty to request an interpretation and definite design to satisfy all concerned. After numerous meetings and correspondence, the accompanying sketch has been adopted by both the state commission and the Milwaukee inspection authorities to the ultimate satisfaction of the local engineers and contractors.

Fig. 16 on page 104 of the Wisconsin State Boiler Code, 1944 issue, is a sketch giving the state commission's suggested methods of installing the Hartford loop on single and two unit boiler installations. This method of installation of the Hartford loop is the same — for all practical purposes — as that recommended by the American Society of Mechanical Engineers in the 1949 heating boiler code. The Industrial Commission of the State of Wisconsin has no objection as to where the returns enter the boiler through the Hartford loop as long as they enter between the lowest permissible water level and the operating water level. In most of the heating boiler installations in Wisconsin, it is found that the installers usually place the horizontal nipple of the return line in the Hartford loop at or slightly above the lowest permissible water level; however, if the contractor sets it too close to the operating water level, he may create a noisy return system.

It is therefore recommended that all installations of this nature be made according to the accompanying sketch, which was drawn by E. J. Schuetz, city of Milwaukee building inspector and approved by F. J. Bishop, supervisor of boiler inspection of the Industrial Commission of Wisconsin, G. M. Kuetemeyer, mechanical engineer of the department of building inspection and safety engineers of the city of Milwaukee, and E. A. Knab for the Heating, Piping & Air Conditioning Contractors Milwaukee Association.

HERE'S THE SKETCH showing the recommendations adopted in Wisconsin for Hartford loops on low pressure heating boilers


Stop valve—if used
Equalizing loop—usually full steam outlet pipe size to below water level then reduced ½ of diameter for the lower connection.
Water Glass
Install this horizontal section of piping so that the lower inside is at the lowest safe water level.
Lowest safe water level which is the lowest visible part of the water glass.
Return Valve
Return Pipe
Note:
Use the boiler mfrs. specifications for the correct installation level for the water column and glass.



Underground Storage Vaults

. . . conditioned to protect county's microfilm records

By Howard Earl
Director, Civil Defense
Los Angeles County

THE LOS ANGELES COUNTY underground storage vaults — completed earlier this year, and designed to withstand the elements of nature and the destruction of bombs of atomic proportions — are now being used by the county and the incorporated cities in the county to store and preserve duplicate microfilm records.

The vaulted area is 65 ft underground and extends 200 ft into the side of a hill. The microfilm is stored in steel filing cabinets, each accommodating approximately 150 reels of 100 ft film. Each reel reproduces 1500 pages of legal size typewritten material. The three existing vaults are the same size — 8 ft wide, 33 ft long, and 10 ft high, with a rounded ceiling (approximately 2600 cu ft). Each storage vault is located at right angles to a central 10 ft wide corridor extending the entire length of the area. Each vault is further an individual safe deposit room protected by hollow steel doors opened only by authorized personnel.

The 12 in. floors and the 10 in. walls and ceilings are of waterproof gunite reinforced only for temperature and control shrinkage, and not for structural purposes. The soil analysis was such that no shoring was necessary during construction. The gunite average compressive strength tested above 7000 psi at 28 days. There were no combustible materials used in construction.

Microfilm must be stored under the correct temperature and humidity so that deterioration will not take place. Low humidities cause film to center split, temporarily buckle and dry out, while high humidities cause the material to buckle permanently, flute, mold, and adhere to the surrounding materials. The preferred humidity is 52 percent.

The recommended temperature for film storage is 70 F, although it may range as high as 80 F without damage. The lower the temperature the higher the relative humidity and somewhere it will reach a dew point. However, it seems that the damage to film is related to the humidity which varies with the temperature.

The third important point for handling and storing microfilm is the filtering of the incoming air. There are many elements in the air which can damage film; among these are the sulfides that abound in air because of industrial installations nearby. Filtering will also eliminate dust and some of the oxidants. Oxidants have a tendency to cause the film to dry out and become brittle.

How the Air Handling System Functions

Year 'round temperature of 70 F, humidity of 52 percent, filtering the air, and an emergency diesel power unit in case of a normal electric power breakdown, make the tunnel an ideal location for the storage and handling of microfilm.

The air is introduced from the outside through louvers in the front of the tunnel and into the intake duct of the air conditioning system. Two permanent type dry steel mesh filters in the air passage filter the air. The air is then passed over electric strips for heating in cold weather, or bypasses these in hot weather. Two other proposed filters can be installed on the system: one, an activated charcoal filter which should remove about 90 percent of the radiated gas particles from the air, and the other an electric filter that should eliminate about 99 percent of the radiated dust particles from the air. These would be installed in the spaces provided at the first sign of enemy attack.

After the air has been heated to the desired temperature, it then is impelled through a $\frac{3}{4}$ hp fan of 1500 cfm capacity. Next, it goes to the humidifier, a fog nozzle operating at 4 lb pressure. The air — having been filtered, tempered and humidified — is distributed through galvanized iron ducts through the corridor and into the three existing vaults.

Louvers in the vault doors discharge the air back into the corridor and out through the escape shaft, a 4 ft diameter centrifugally spun concrete pipe 65 ft high. At the top of this shaft is a $\frac{1}{2}$ hp 1100 cfm fan to help pull the air out through additional louvers located in one of the concrete walls at the top of the shaft. This shaft also serves as an emergency exit from the tunnel in case the front entrance is blocked.

The system is of sufficient capacity to accommodate four more proposed vaults to be extended off the central corridor in the future.

There are two restrooms off the main corridor, each having its own independent exhaust ventilating system of 100 cfm.

Herman Charles Light was the architect and engineer for the entire project, the consulting mechanical engineer was Lawrence B. Freed, and the general contractors were the Contracting Engineers Co. of Los Angeles. T. Harold Jacobsen, of the Genealogical Society of the Church of Jesus Christ of Latter Day Saints, was consultant to the civil defense commission relative to film storage problems.

QUESTION OF THE MONTH

Can We Add Summer Cooling To Our Warm Air Systems?

. . . . . that's what a chain of clothing stores wants to know. There are five stores, each heated by an oil fired, warm air furnace. In answer, G. A. Voorhees, technical secretary of the National Warm Air Heating and Air Conditioning Association, comments as follows:

WHEN THE EXISTING heating system in a store building is of the forced warm air type, it of course already has one of the indispensable elements of a proper cooling system — controlled air circulation. This often means a substantial saving in the cost of adding summer air conditioning. The system needs to be carefully checked, however, to see that it meets these requirements:

1) That the air circulating component (blower and motor) of the present heating unit is suitable for cooling. Does it have the capacity (a) to deliver the air volume required for cooling and (b) to deliver it against the added resistance of the cooling coils?

Many heating units — probably most of them now in use — do have adequate capacity, but this point needs to be determined by someone who has more than rule-of-thumb knowledge of the requirements.

2) That the present duct system will be suitable for cooling. If, for example, the store building is partitioned off into two or more rooms, it quite often happens that the distribution of the cooling load is quite different from that of the heating load. One room of a store building — or one section of a large room — might easily have a heat loss which would require that only 30 percent of the heated air in winter be delivered to that section. Yet for cooling, this same section of the building might have a summer heat gain that would require the delivery of 50 percent or more of the total air delivery. Can the present duct system be dampered or otherwise adjusted to take care of such variations?

In many existing forced air heating systems, this can be done and is being done with notable success. Again, it's a matter to be decided by someone who has a thorough understanding of cooling needs and of duct system performance.

3) That the present registers or grilles will insure satisfactory distribution of the air within the rooms. The air delivery from a register may be genuinely satisfactory for heating but if it does happen that the distribution of cooling requirements is radically different, what will be the effect on comfort conditions?

Too many summer air conditioning systems meet the specified requirements completely for dry bulb temperature and relative humidity but the *distribution* of cool air within the room is anything but comfortable. There are too many air conditioned restaurants and hotel dining rooms, for example, where the first thing you feel when you sit in certain parts of the room is a cascade of air down the back of your neck. With that unfortunate condition found in systems designed exclusively for summer air conditioning, it's something that needs to be watched also when summer cooling is added to a winter air conditioning system.

SHOULD WE USE SADDLES TO PROTECT INSULATED PIPING?

If you don't have the answer to one of your problems, chances are someone else does — or can be helpful on part of it. That's the purpose of this "idea exchange" in each issue, where questions on heating, piping and air conditioning are asked and answered.

You are invited to contribute a question for publication, or an answer to a published question. . . . . Please address your reply to the Editor, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.

Here is a question asked by a prominent architectural and engineering office. Can you help them out?

"We would like to get an idea as to the use of metal protection saddles with insulated pipe, supported by rings or clevis hangers. We are referring only to low pressure steam lines, hot water heating lines, and chilled water or brine lines, where expansion and contraction of the pipe is not great.

"Is the initial cost (material and labor) of using protection saddles justified by the longer life and lower heat loss that is afforded by their use?

"We have found that in the installation of covered piping in the services mentioned above, there seem to be three methods used:

"1) The pipe is covered and the ring or clevis fitted over the covered pipe, with no protection saddle and with the insulation bearing the supporting load.

"2) The covering is stopped at the point of support and the ring or clevis fitted over the bare pipe. The insulation is then fitted around both the pipe and the ring or clevis.

"3) Protection saddles are used in the conventional way.

"Method (1) will afford the lowest initial cost. Method (2) is next and Method (3) shows the highest first cost.

"We do not believe that the average insulation used in such installations will stand up very long, if Method (1) is used.

"We would like to get an expression from HPAC's readers who may be familiar with this matter, so that we can set up some kind of a comparison between first cost and the expected life of the covering using the methods mentioned above— also giving due consideration to heat leakage, which will vary with the method used."

Easier To Control Than To Regulate

It sounds strange, but as Harry E. Clo, of the American Air Filter Co., points out here it is less difficult to reduce air pollution with available equipment than it is to write a reasonable regulation governing emissions from industrial processes

DURING THE PAST 10 to 15 years — and particularly since World War II — a great deal of time, money and thought have been expended on the problem of "cleaning up" industrial plants. Not only management and plant operating personnel but manufacturers of dust control equipment, consulting engineers, insurance companies and agencies of the federal, state and municipal governments have been active in such efforts.

As a result, great progress has been made in improving working conditions within plants or manufacturing areas. Comparable efforts have been made — but with noticeably less success — in the reduction of the contamination of the air surrounding them.

Our purpose here is to discuss in general the sources of some of these contaminants, possible methods of control, and equipment available at reasonable cost and with reasonable maintenance for attaining control.

Public nuisance complaints are usually caused by the dropping of relatively large particles (5 microns size might be the dividing line) into the atmosphere of an industrial plant, causing the well-publicized problems of deposition on cars, porches, window sills, laundry, etc.

Smaller particles in heavy concentrations (such as the 2 to 5 grain loading escaping primary collectors) can cause the same offense. Under unfavorable weather conditions and/or plant locations, fine particles in low to moderate quantities (such as zinc oxide fumes from brass melting furnaces) will hang at ground level instead of rising into the atmosphere and dispersing.

Collection equipment is available at reasonable cost to eliminate most of the public nuisance type of air pollution problems caused by coarse particles from foundry or other industrial stacks.

Fine Particles Present Perplexing Problems

Fine particles — ranging from 5 microns down through the submicron sizes of metal fumes and the smokes — stay in suspension for long periods and, under unfavorable meteorological conditions, can accumulate, stratify at or near ground level, and cause the perplexing smog problem.

Many processes produce such fine particles in the presence of high temperature gases, making the collection problem expensive and control far from complete. Air pollution regulations covering such problems must be based on attainable results with present-day control equipment which can be installed and maintained at reasonable cost. The complexity of conditions, and the large number of variables from one industry to another, make the question of reasonable standards a baffling engineering problem.

For lack of an engineering answer to the problems, existing regulations designed for coal burning combustion gases have been extended to include industrial processes. The 0.4 grains per cu ft figure was established by the American Society of Mechanical Engineers as a reasonably attainable maximum for helping solve the "public nuisance" problem from fly ash released through coal burning boiler stacks.

The Ringlemann chart for visual comparisons of smokes was set up as a reasonably attainable maximum for the "air pollution" problem from smoke emission. Too often this visual standard is carried over to industrial applications without recognizing that it was never intended to offer a means of detecting or evaluating solids concentration in a gas stream, but was offered as an indicator for proper combustion control — the major factor in reducing the coal smoke caused by incomplete combustion of the fuel.

A review of existing regulations indicates an attempt has been made bodily to apply standards designed for boiler fly ash and smoke control to the broader, immensely more complex control of industrial process emissions. Sometimes the 0.4 grain figure is reduced to 0.25 or 0.3. Allegheny County, Pa., in a new regulation which is still based on the boiler concept, has recognized and made exceptions for open hearth, byproducts, coke plants, sintering plants, and Bessemer convertors, realizing the lack of similarity and wide range of conditions that are encountered in industry as opposed to the modest variations in conditions when only smoke and fly ash from coal burning gases of combustion are involved.

"Grains per Cu Ft" Standard Misleading

In industrial problems, dilution with room or outside air is a possibility which could reduce concentrations to meet ordinances without any collection equipment for many a process. The electric furnace demonstrates the situation. If the furnace is ventilated by roof monitors, wall exhausters or other means of general exhaust of the melting room, an exhaust volume of 100,000 cfm might be required. With local exhaust hooding attached to the roof ring, metal fumes and smokes can be exhausted by 20,000 cfm — making collection

more practical with the lower gas volume. Yet the removal of 80 percent of the solids with a collector in the latter case would result in the escaping concentration in grains per cubic foot being the same as in the case of the larger general ventilation volume where no collection equipment was employed.

Foundry cupolas demonstrate the same "conflict". A cupola may require 15,000 cfm with one charging method and only 3000 cfm with the closed top bell charging method. Pounds of solids released during the melting operation will be identical, pounds of solids collected by the air cleaning device the same, and pounds of solids discharged to the atmosphere identical — yet the concentration per cubic foot of cleaned gas will be five times greater in the top bell charge arrangement due to the drastically reduced gas volume involved.

"Visibility Yardstick" Fails Miserably

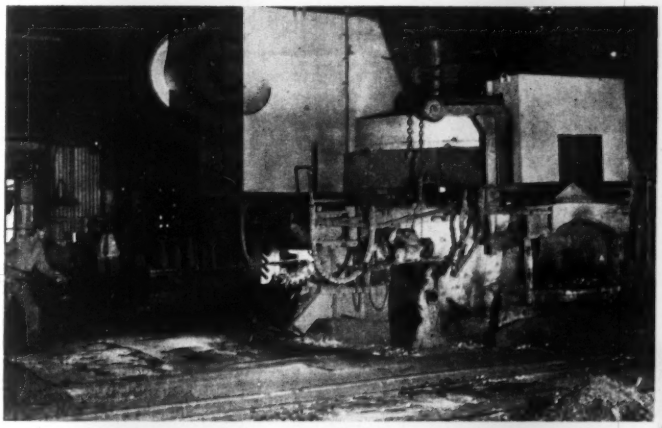
The regulation of gas cleanliness using a visibility yardstick fails miserably when attempted against a background of industrial emissions. Differences in particle size, color, and discharge velocity, the presence of different materials, and the possibility of water vapor all make visual determination of solids concentration an unreal and an impractical method. Emission densities are not an indication of poor process control and have no parallel with the use of the Ringlemann charts as a gage of combustion control in boiler practice.

Easier to Control Than To Write Regulation

It's strange, but the problem of reducing air pollution is really less difficult than is the problem of establishing a regulation that will reduce industrial air pollution as far as possible and still stay within the performance range of present-day equipment at reasonable cost and maintenance.

Insofar as the air pollution problem is concerned, extension of "fly ash and smoke abatement codes" developed for coal burning gases of combustion to industrial processes will be complicated because:

a) No regulation will be effective that does not have sound engineering for its background, or whose requirements exceed those attainable by existing equipment at reasonable cost and reasonable maintenance.



STANDARDS BASED on "grains per cu ft" are misleading, as explained in the text. Electric furnace installations — such as this one — demonstrate the author's point

b) Standards of required air cleanliness measured in unit of weight per unit of gas volume are meaningless for those applications where extensive dilution by added room or outside air to the exhausted contaminant is practical.

c) Visual methods of determining solids concentration in stack gas are futile except as a crude gage to indicate discharge conditions that *might* be in violation of a standard based on a permissible weight basis.

d) Stack sampling procedures are expensive and time consuming, involving added cost to industry — whether such data is obtained by the plant, a consulting engineer, an equipment manufacturer, or a governmental agency.

Basic Types of Dust Control Equipment

Cost is a factor in establishing reasonable yardsticks for air pollution control, yet it is difficult to suggest relative cost of equipment without specifying dust loadings — including physical and chemical characteristics, exhaust volumes, temperatures, combustion gas, etc.

Basic types of dust control equipment can be divided into three general classifications.

Group No. 1 can best be described, perhaps, as dry primary mechanical collectors — such as the low pressure cyclone, the high efficiency centrifugals, and the dry type dynamic precipitators. Due to their basic design, in which the efficiency is a function of particle size and specific gravity, they are somewhat limited as far as the solution of air pollution problems are concerned.

Group No. 2 must really be divided into two sub-classifications. The first is the high efficiency wet type of collector — the wet type dynamic precipitator, the orifice type wet collector using different collecting elements, and the wet centrifugal collector. Wet scrubbers, packed towers, etc., also fall in this classification.

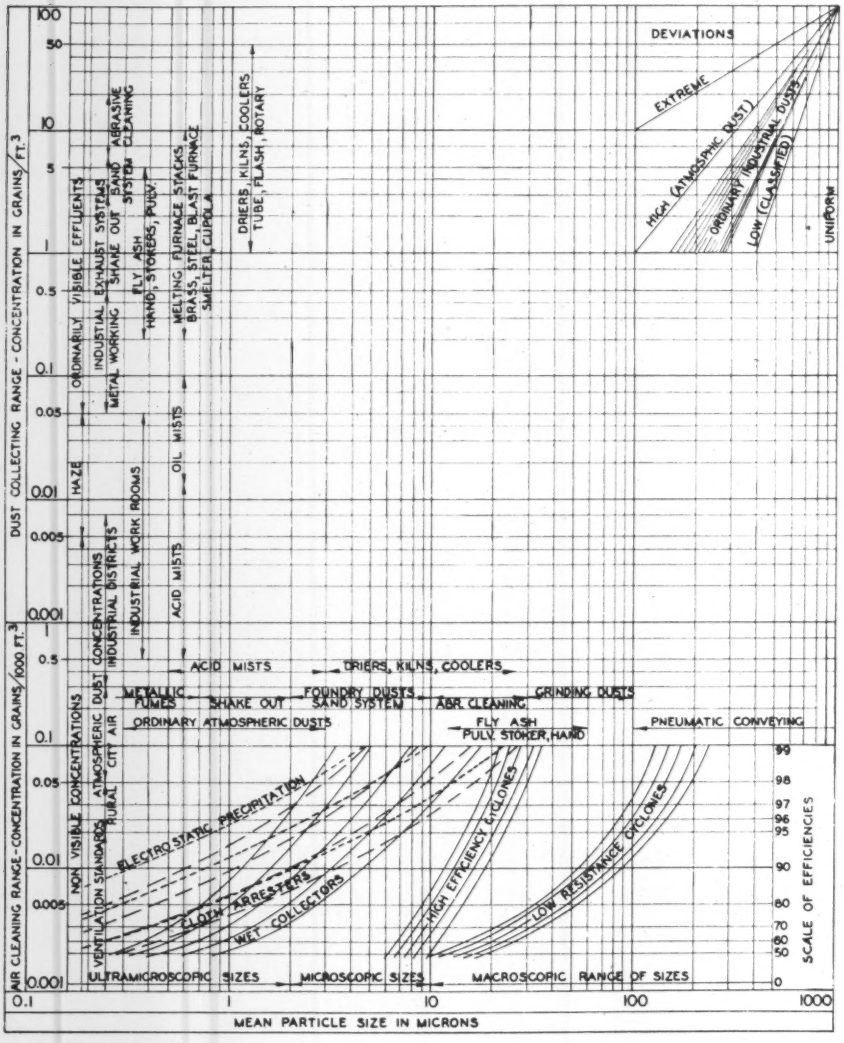
The other sub-group is the fabric collector, made either in the form of bags or envelopes using cotton sateen and wool as a filtering material. Collection equipment of this type is comparable to that of wet collection both in cost and efficiency. Obviously, however, these collectors are not generally satisfactory for high temperature work where condensation may become a factor, or where wet sticky materials are being handled which would be difficult to move. Introduction of synthetic and glass fabrics have reduced temperature limitations, although at increased cost.

In Group No. 3, falls the more expensive control equipment for *fine* submicron size particles at elevated temperatures — equipment such as high voltage electrostatic precipitators of the Cottrell type and ultrasonic agglomerators.

The chart on page 116 shows a recent compilation of data on collector performance.

DATA SHEET

Range of Particle Sizes, Concentration and Collector Performance



Compiled by S. Sylvan, April 1952.
Copyright 1952 by American Air Filter Co., Inc.

Acknowledgment of partial sources of data reported:
W. G. Frank, American Air Filter Co.; Size and Characteristics of Airborne Solids.
First and Drinker: Archives of Industrial Hygiene and Occupational Medicine, April 1952.

Trade Name Not a Shield Against Warranty Liability

THE PRECIOSE JEWELRY CO. [all names herein are fictitious] decided that its luxury-loving customers would be more purchase-minded if its place of business were delightfully air conditioned. This decision was speeded by a conversation that one of the store's employees had with the chief executive of De Gree, Inc., manufacturers of heating and ventilating equipment. De Gree — in subsequent interviews with Mr. Preciose — waxed eloquent respecting the merits of a certain type of cooling system. Preciose wanted a quiet system that would be sure to cool the front end of the store; otherwise, he would not be interested.

Mr. De Gree went into considerable technical detail with Mr. Preciose on the subject. He explained and discussed the various ways of "securing a cooling action", the cost and types of equipment, the best location for the apparatus, etc. He assured Preciose that the recommended equipment would be satisfactory in every way and "would make no more noise than an electric fan."

Since De Gree did no installing, he introduced to Mr. Preciose a representative of the Ecks-Wye Piping & Air Conditioning Works, with whom Preciose agreed on "The Convectorative Cooler" system at an agreed sum to include electrical and other appurtenances. Ecks-Wye wrote Preciose a letter to that effect and, Preciose having impliedly accepted its terms, the piping concern installed the cooler on the upstairs balcony of the store.

Trouble, Trouble . . . and Trouble

Let the court's own language — in summing up — tell of that equipment's misdeeds: From the beginning of its use "it was noisy, it scattered water . . . it drew dirt and dust from the alley in back of the store and blew" them "into the store, it failed to reduce the temperature and it caused a musty odor to be noticeable."

After Preciose had complained to Ecks-Wye about the system's unsatisfactory operation, the piping firm relocated the cooling unit in the private office. Papers were blown off the desks as a result. Subsequently, a new motor was installed, various tinkerings went on, but still the system didn't work. Despite earnest efforts, there was not much difference in the store's temperature whether the equipment was running or not. So things stood all summer and through the winter — the system meanwhile remaining unpaid for by the store.

In the following spring, Ecks-Wye, De Gree and Preciose went into a huddle, the latter declaring that he could not endure another summer under the unsatisfactory conditions. He demanded that the equipment be taken out. The two temperature firms, however, persuaded him to give the system further trial, assuring him that it "could be fixed" by making additional "repairs". By August the recorded store temperature was 98 deg, the noise made conversation with customers difficult, and dust and dirt drawn in from the alley was scattered upon the watch repair benches, hindering this work.

"Implied Warranty" the Defense

When Ecks-Wye sued Preciose for cost of labor and materials, the store put up the defense of "implied warranty". Reduced to conversational terms, the legal colloquy was like this:

"We don't owe you anything, because by implication you warranted this equipment and it won't work."

"Sorry, but we warranted no equipment; we simply *installed* the brand and type that you told us to put in. In respect to this job we are installers, not sellers."

"Nonsense! We know nothing of air conditioning systems or equipment and did not suggest or prefer any particular type. The name 'Convectorative Cooler' means nothing to us. We were under the impression that De Gree, Inc., were going to do the installing anyway, until we got Ecks-Wye's letter."

"Ah, but by accepting a specified, known article with a trade name, Preciose has waived any implied warranty as to its fitness for any particular purpose."

In rebuttal, Preciose cited the law:

"Where the buyer, expressly or by implication, makes known to the seller the *particular purpose* for which the goods are required, and it appears that the buyer *relies* on the seller's *skill or judgment* . . . there is an implied warranty that the goods shall be reasonably fit for such purposes."

The Opinion of the Court

Affirming judgment of the lower court, the higher tribunal found against Ecks-Wye Piping & Air Conditioning Works, which was therefore unable to collect for the job. The supreme court disposed of Ecks-Wye's contentions in a lengthy opinion under four heads:

1) As in a similar cited case, no reliance was placed upon the *trade name* of the article, but rather upon "its *fitness* to accomplish its purpose."

2) Ecks-Wye's customer was primarily interested in air conditioning his place of business rather than in purchasing any specific article. The first time that the trade name "Convectorative Cooler" appears to have been mentioned is in Ecks-Wye's letter to Preciose, offering to furnish such equipment. Implied warranty of fitness for the particular purpose is not negatived by seller's use of a trade name "merely for convenience in identifying the equipment to be installed". Efforts of Ecks-Wye to

[*Concluded bottom of next page*]

William Hurd Hillyer, author of this article, is a contributor to a number of banking and financial publications and has written several books on business. A former vice president of the Atlanta Trust Co., his work there gave him a practical legal background.

SAM LEWIS' PAGE

Returning Condensate from Group of Buildings

SAMUEL R. LEWIS, consulting mechanical engineer and a member of HPAC's board of consulting and contributing editors, comments informally each month on practical heating, piping and air conditioning problems. In answer to a request from a reader, he writes here on the problem of returning the condensate from several buildings of a group, all but one of them having two pipe vacuum steam heating systems

SOMETIMES IT IS expedient to connect a return main from one building of a group into the return main that serves other buildings of the group. This "Page" has received a question about vacuum steam heating involving such a situation, which I shall paraphrase as follows:

The institution has a building "D" that is an addition to the existing group. The heating system of the existing group — except that in "D" — is two pipe vacuum steam, with a thermostatic trap on the outlet of each radiator and at all other points of possible communication between the steam, or pressure side, and the return, or vacuum side. There is a vacuum pump in the central boiler plant connected with long underground mains from the various buildings. This pump maintains subatmospheric pressure in the return system while also removing the condensate and the air from inside the return piping.

Building "D", however, has a different steam heating system. High pressure steam from the central boiler plant supplies this building, through a pressure reducing valve to maintain 2 lb or more steam pressure in the supply mains. There is a high pressure trap on the end of the steam main prior to the reducing valve in building "D" and there are several low pressure float traps at the ends of the low pressure mains. The traps all discharge into a small condensate receiver which is vented to the atmosphere. The condensate flows from the bottom of the receiver to the inlet of an electric pump.

It is desired to deliver the clear hot water back to the boiler plant and to use the amply large subatmospheric return mains.

Our correspondent wishes to be told how the condensate from building "D", assuredly at atmospheric pressure or higher, can be accommodated in the underground vacuum return main, without affecting the subatmospheric pressure in that pipe, and without impairing the successful very low pressure that has served the other buildings.

I know of many institutions with groups of buildings that have lived with this problem — frequently to shortening of the lives and tempers of the operating crew. Where dormitories are concerned, there is much interruption of early morning sleep due to water hammer in the pipes and radiators.

Any good vacuum trap sales engineer knows how to correct the trouble. Another good way would have been to shoot the designer of the heating system in building "D" before he designed it.

The preferred answer is to have a trap on every communicating point between the steam main and the return mains in building "D". The pump in building "D" should be a vacuum pump, with its inlet below the return mains or with an accumulator tank below these mains. The discharge pipe from this vacuum pump then should go to an airtight tank containing a float that opens a valve. This valve is in a pipe that runs out of the bottom of the tank and into the existing return main that serves the other buildings of the group. If water in the tank lifts the float, the water runs into the return main but no air can enter this main to alienate its subatmospheric pressure.

Any high pressure condensate from the traps on the main that supplies building "D" can be expanded in a little tank made of a piece of pipe with capped ends and the vapor may enter the low pressure steam main while the condensate will be trapped into the suction pipe of the vacuum pump in building "D".

LAW AND YOUR PROFITS —

[*Concluded from page* 117]

make it work lend color to the idea that he understood he was to install a suitable air cooling system — not that he was "selling merely a patented cooler".

3) Contention of Ecks-Wye that he was just an "installer" rather than a "seller" was knocked out by the court, which referred to his letter undertaking not only to "install" but to "furnish" the equipment.

4) Ecks-Wye claimed that Preciose did not rely on his skill and judgment, since he did not enter the negotiations until the type of system had been agreed on. The court pointed out that Ecks-Wye might have submitted his bid to De Gree or might have bid only on installation and let De Gree submit a separate bid; but Ecks-Wye chose to become the seller and in so doing he adopted De Gree as his representative for the sale.

From this instructive case the heating, piping and air conditioning contractor will learn (a) to be sure at the outset that his status is clearly defined as seller or installer or both, respecting any special equipment or the job as a whole; (b) where one or more articles in the job have trade names, not to regard those trade names as a shield against his warranty liabilities unless he is specifically exempted; (c) where more than one firm enters into the contractual picture, to have the status of each definitely established; (d) even if the client specifies certain equipment, that such client may disclaim all knowledge of its technique and aver — perhaps rightly — that he was depending wholly upon the contractor's superior knowledge and skill.

[Note: While this discussion applies to an actual case, it should be remembered that legal rules vary in different states.]

Heating, Piping & Air Conditioning

THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

JOURNAL *SECTION*

Tropical Housing Research Studies

An Appraisal of Factual Investigations Needed for Design of Tropical Homes for Maximum Summer Livability

By W. R. Woolrich,*
Austin, Tex.

SUMMARY—The reaction of man to his environment in hot climates should be studied under conditions effective in such areas, and should include acclimatization and diet if proper conditions are to be established for health and comfort. Structures for hot climate shelter should not be similar to those suitable for temperate or cold zones. Consequently, century-old features of building structures used in hot climates are being investigated at The University of Texas, and architectural designs are being adapted to hot climate requirements.

The cooling effect due to transpiration of grasses, shrubs, vines and trees is also being studied. Tests on effects of building heat storage in localities having high daytime solar radiation and subsequent good night cooling, are revealing errors due to misuse of the *U*-values in such areas. A re-study of temperature and humidity standards for acclimated people in hot zones is suggested.

INCREASED KNOWLEDGE of the reaction of the human being under sustained and environmental high temperature conditions is greatly needed. The principal research data recorded to date on the exchange of heat between the body of a man and his thermal environment are from observations made in western Europe and the northern United States where outdoor climatic conditions, generally, prevailed that were moderate or cool.

Unfortunately, most experiments carried on in human calorimeters or test cells on the behavior of man under hot climatic conditions in northern locations give little recognition to his total acclimatization preceding such tests, especially with regard to his diet previous to and during such studies. Those who have lived for many years under semi-tropical conditions have observed the effect of the diet upon the metabolism of their bodies and have experienced considerable heat distress in traveling from cold to hot environments because of the time lag incident to digesting and utilizing the foods selected by the induced appetite of the colder zones. The normal appetite dictates a much different food selection to the individual under cool and hot climatic conditions.

*Dean of Engineering, The University of Texas.

Upper Limits Need Revision For Warm Climates

The experiences of millions of human beings, who live normal high-energy lives in the tropical and semi-tropical zones under sustained high thermal environments, indicate that while many of the test data secured in northern locations are valuable, they are not all conclusive, especially in the upper limiting zones of temperature, humidity and air movement for these regions. This applies whether the areas considered are coastal or inland, humid or semi-arid.

The principal error made by the inhabitants of many warm-climate areas is their use of building designs and air-conditioning procedures indigenous to the cold climates transplanted and then applied to their regions. Some modern examples of the total disregard of the architectural fitness of structures from the point of view of their thermal characteristics can be seen in the thousands of Cape Cod houses being introduced in some of the treeless areas of the suburbs of Washington, D. C. (and Washington's climate approaches the semi-tropical), or in one exclusive area of Dallas, Tex.,

in which the prevailing structures are two-story English designs with no overhanging eaves and many unshielded windows. Another example is a University building in Austin that is erected on a north-south axis while the prevailing breeze of the summer is from the southeast and the solar heat of the afternoon has free access to 40 percent of the windows of the structure, thus making these western rooms quite unusable unless further treated.

Any comprehensive examination of currently published text, reference and data books on housing, heating, ventilation, refrigeration, air conditioning, architecture, community planning, or engineering reveals very minor references to the needs and requirements of structures designed as homes, office buildings, barracks, or industrial edifices for the tropical and semi-tropical parts of the world.

The engineers, scientists, architects, and authors in the building professions have been very negligent in failing to recognize that more people of this earth are refugees from heat than from cold. Volumes of data are presented on how to maintain comfort in the temperate zones but largely ignore the problems of livability of structures of the tropics and semi-tropics.

In the investigations and surveys of the Ceramic Housing Research Project, directed by the *Bureau of Engineering Research* of The University of Texas, considerable new data have been made available to engineers and architects, but some of the author's experiences in searching the literature for applicable accurate information have been most disappointing.

Four Research Projects Under Way

Four areas of field and library research, prompted by these housing studies, have revealed the need for much more complete investigations that should be continued by The University of Texas to add to the available knowledge. These four researches will be discussed before considering other tropical housing problems that deserve scientific investigation by technical research groups.

The first of these four is directed toward expanding the factual information on the effects upon local temperatures of the transpiration of grasses, shrubs, vines, and trees in the arid and semi-arid areas of warm climates. It is well established that such transpiration, especially of grasses, shrubs, and vines, does have an evaporative cooling effect upon the hot dry breezes at the window levels and that the transpiration from adjacent trees causes a similar phenomenon at the higher levels to create some up-draft of air currents.

The researches of several decades past by Dr. Lyman Briggs,[1] then in the Department of Agriculture, and later by Dr. E. C. Miller,[2] and by Dr. Paul Kramer,[3] and others on leafy vegetable crops, farm crops, and trees revealed that the amounts of water vapor released daily to the air by transpiration amounted to several thousand gallons to each acre. But the literature is quite void of any research reports of actual measurements of the influence on local temperature moderation due to shrubs and grasses planted in proximity to residences and other dwellings. Shrub, vine, and tree plantings have been provided around selected houses of the Ceramic Housing Research Project, but until the summer of 1952 there was not sufficient foliage to produce appreciable transpiration from which to determine the effects. The schedule calls for a transpiration-temperature study on designated houses, together with an investigation of the relation of the dry bulb temperature to the prevailing wet bulb temperatures at different elevations above the ground in both shrubbed and wooded areas.

A second field of research is directed to finding useful data and recorded information on the centuries-old building practices for the tropical zones evolved by the bygone generations who, by hard experience, had learned to live in some degree of comfort under high-temperature conditions. The contemporary books of fiction have often been more useful than technical records in revealing the general practices and procedures that have made hot semi-arid areas livable through selection of building materials and design.

Fortunately, many of these practices have been well perpetuated by the darker-skinned races of the tropical areas, but it is most desirable that a well-planned research study be made and the results reinterpreted in terms of modern structural practices.

Some of those associated with the Ceramic Housing Research Project have purposely made an extensive objective survey of selected houses of contrasting designs—including early Spanish, Victorian, French, Scandinavian, and ultra-modern. Those houses visited were widely distributed over the South and West, especially those that had a reputation for either exceptional livability or for the other extreme, *stagnating closeness*. Further investigations are now under way on specific houses and buildings of some of these types.

The third investigation in which the University has a deep interest is that of obtaining complete information on the wind currents induced by, as well as those prevailing about, any house of typical design. The aircraft industry, with less than two decades of research experience, knows far more of the air-current paths about the wings and fuselage of an aeroplane than those who have been interested in house building can claim to know of air movements around a housing structure, although we have centuries of home-building experience behind us.

The fourth study (in which it is most evident there has been extensive misapplication of information) is in the use of the coefficient of heat transmission (*U*-value) for walls and roofs far beyond its applicability. In areas of marked diurnal changes, where high solar heat values persist during the day with subsequent cool nights, the misuse of the *U*-value under assumed steady-flow conditions has been most unfortunate and misleading. Recent studies, as reported by Prof. W. E. Long[4,5] and Dr. F. E. Giesecke,[6] are bringing new information to current literature.

Fig. 1, taken from a recent paper[5] by Professor Long, indicates the

divergence of computed and actual values of heat flow through a wall built of a 6-in. hollow clay tile with a ½-in. plaster finish. Professor Long states in this paper that under conditions of periodic cycling of the temperatures, as is experienced by walls exposed to outdoor air, neither a uniform nor uni-directional flow of heat is obtained, and therefore the rate of heat flow through the wall cannot be expressed by the conventional heat flow equation involving the use of the *U*-value.[5]

While these four particular investigations are receiving special attention in the Ceramic Housing Research Project, there are many other research problems related to the semi-tropics and tropics that have become of increasing importance and interest to the investigators.

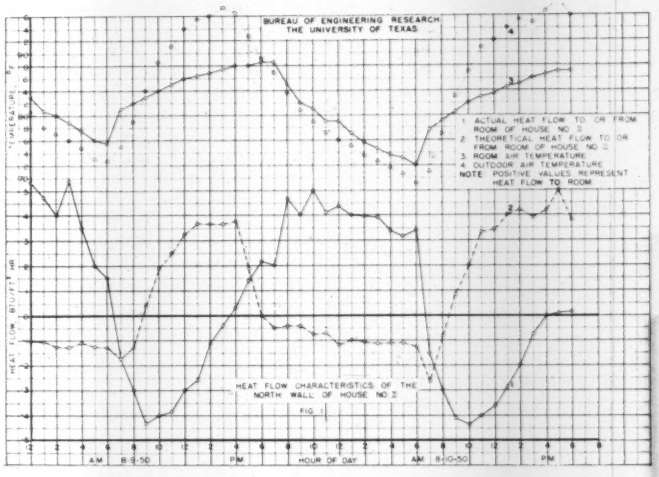

BUREAU OF ENGINEERING RESEARCH
THE UNIVERSITY OF TEXAS
1. ACTUAL HEAT FLOW TO OR FROM ROOM OF HOUSE NO. II
2. THEORETICAL HEAT FLOW TO OR FROM ROOM OF HOUSE NO. II
3. ROOM AIR TEMPERATURE
4. OUTDOOR AIR TEMPERATURE
NOTE: POSITIVE VALUES REPRESENT HEAT FLOW TO ROOM
TEMPERATURE °F
HEAT FLOW BTU/FT²/HR
HEAT FLOW CHARACTERISTICS OF THE NORTH WALL OF HOUSE NO. II
FIG. 1
A.M. 8-9-50
P.M.
HOUR OF DAY
A.M. 8-10-50
P.M.

Fig. 1—Divergence of actual from theoretical heat flow from test of house No. II

Tropical Research Problems

In tropical areas most human beings take refuge from the heat of the sun by remaining in shaded areas during much of the day. Their degree of comfort under these conditions will depend very largely upon the air velocity over their bodies and upon the temperature of the walls immediately surrounding them. Yet the public generally is not aware of the large part the wall temperatures about them play in determining their comfort. In the air conditioning of homes and structures we need to do an extensive educational job on the desirability of keeping all walls within a housing structure cool if the human body is not to feel oppressed from lack of heat absorption by the walls about it. Especially is this noticeable if such walls themselves approach the skin temperature.

While direct solar heat is in itself avoided by individuals in tropical areas, our architects, engineers, and builders continue too prevalently to build houses where the effects of solar heat are accentuated or sustained by the features adopted to make the homes attractive or to meet some poorly developed specification.

For example, the injudicious application of picture windows where such units serve as solar-heat traps, the installation of large areas of natural window lighting where artificial lighting sources would be far more conducive to summer comfort, and the installation of high-wattage mazda-type lamps, where low-wattage fluorescent lamps could well do the job with probably two-fifths of the heat load are such common errors of builders' judgment in hot climates that the exceptions are fewer than the mistakes in many tropical cities.

Cooling Standards Should Fit Tropics

Probably nationally our greatest sin of omission in air conditioning practice is directly traceable to our mistakes in publishing heating and cooling standards that are keyed to the 40th parallel, as if the United States and all of its insular possessions and other military outposts were located on or in near proximity to that latitude. Prescribed floor temperatures, comfort charts, heat pump applications, physiological principles of heating and cooling, and *U*-value applications are typical examples of the errors, broadcast through our national publications, which arise from the assumption that all of the 150,000,000 people of the United States are in homes related to this 40th parallel. Some 50,000,000 citizens of this nation must journey northward many hundreds of miles to experience the phenomena typical of such a latitude.

The solutions of heating problems of the United States are rightfully adapted to some temperate zone such as the 40th parallel since the critical problem of keeping alive in these areas during many months of the year is that of supplying sufficient heat; but for the most essential cooling problems, the critical latitude of the United States is not the 40th parallel. For at least one-third of the citizenry of the United States, including the peoples of the insular possessions and mandates, the more urgent air conditioning problem is that of maintaining comfort livability during hot weather, not cold. Air cooling procedures and standards should be directed and related to this part of our American citizenry, because if cooling procedures can be successfully applied for this part of our American population, similar practices will most likely suffice in the more northern temperate zones. In fact, the really urgent world market for cooling systems is in the tropical and subtropical areas rather than in the regions lying on or north of the 40th parallel. The usefulness of some of the specifications of prevailing United States codes and standards

for air cooling when applied to tropical zones is questionable. Some specifications of our accepted existing codes for computing the cooling load are actually incorrect when applied to tropical areas.

Air Motion Essential

Probably one of the least noticed errors in using temperate-zone procedures and practices in equipping tropical houses and buildings is in the specifications on fan requirements. In determining the fan needs to keep the individual cool in houses or buildings, however, there is not much relationship between the number of air changes provided per hour, or the cubic feet of air provided per occupant, and the cooling effect. The principal objective in fan cooling is to obtain an air velocity over the body or bodies of those within the structure. In tropical regions hundreds of fans are used on open porches, patios, and verandas where only the rate of air movement in relation to the human beings is of interest in the cooling process.

Charts that indicate temperature and humidity conditions injurious to health need to be restudied in light of the fact that many millions of people live weeks and even months each year under climatic conditions proscribed as dangerous to health in official publications of our technical societies, yet some of these same people probably enjoy a higher degree of freedom from the principal recognized *killing diseases*, such as heart disease and cancer, than those of the cooler climates. Man originated in the tropical areas of the earth according to both the Biblical and the Darwinian historical accounts of creation. Where the plagues of malaria, hookworm, yellow fever, typhus, and similar warm-climate diseases have been eradicated, he still seems to be a most adaptable, energetic and productive individual under any thermal environment that is similar to that of the cradle of creation.

Dr. C. A. Mills, in his book *Climate Makes the Man*,[7] raises the question as to whether the people of the colder climates are not paying too high a price for their extra energy induced by the sustained cold periods of many months each year. He indicates that both the disease of the heart and cancer take a greater toll of those who live in cold regions than of those resident in the milder climates.

In recognition of the urgent need for additional and better information and research data on tropical housing and building for both civil and military uses, the *Building Research Advisory Board* of the *National Research Council* has appointed a Committee on Tropical Housing and Building under the chairmanship of the author. Working in close cooperation with this committee are three sub-committees under the sponsorship of the University of Florida, The University of Texas, and the University of California at Los Angeles, for the regions of the Gulf Southeast, the Mid-Southwest, and the Far Southwest, respectively.

References

1. Daily Transpiration during the Normal Growth Period and Its Correlation with the Weather, by L. J. Briggs and H. L. Shantz (*Journal of Agricultural Research*, Vol. 7, October 1916, pp. 155-212).

2. *Plant Physiology*, by E. C. Miller (McGraw-Hill Book Co., Inc., 1938, 2d Ed.).

3. *Plant and Soil Water Relationships*, by P. J. Kramer (McGraw-Hill Book Co. Inc., 1949).

4. Thermal Characteristics of Ceramic Walls, by W. E. Long (*Clay Products Association of the Southwest Research Report* No. 5, 1951).

5. Thermal Properties of Masonry and Frame Houses, by W. E. Long (*Clay Products Association of the Southwest Research Report* No. 6, 1951).

6. Research on Seven Houses in Austin, Texas, by F. E. Giesecke (*Building Research Advisory Board*, Washington, D. C., 1950).

7. *Climate Makes the Man*, by C. A. Mills, M.D. (2d ed., Harper & Bros., 1942).

Standards of Temperature

THE INTERNATIONAL Temperature Scale was first adopted in 1927 to provide a scale which would conform as closely as possible to a thermodynamic scale proposed many years earlier by Lord Kelvin. The scale which he proposed was based on a relation between the efficiency of a reversible heat engine and the temperatures between which the engine operates. This scale is independent of the working substance in the engine.

The International Temperature scale of 1948, which has been in use at the National Bureau of Standards since January 1, 1949, was adopted at Paris by the Ninth General Conference on Weights and Measures. It is a revision of the scale of 1927, and is based on the six fixed points shown in Table 1.

The most commonly used fixed point in thermometry is the ice point, which is defined as the temperature of equilibrium at a pressure of one atmosphere between ice and air-saturated water. In practice, this definition is difficult to realize exactly because all impurities except air (the composition of which is not specified) must be absent and because complete saturation by air is difficult to attain. Fortunately, the effects of these factors are small except in measurements demanding the highest precision. When the ice point was first defined, the ice bath, made of finely divided pure ice and distilled water exposed to the atmosphere, was assumed to be sufficiently accurate to fix the ice-point temperature within 0.001 deg C. Later, however, when an accuracy of 0.0001 degree C was desired, a more reproducible standard became necessary. The Bureau therefore began investigation of the triple point of water, defined as the temperature at which ice, liquid water, and water vapor are in equilibrium. As a result of this work, a special apparatus known as a triple-point cell was designed for determination of the triple point, and the triple point is now used by the Bureau instead of the ice point for high-precision measurements.

The triple-point cell consists of cylindrical glass container having a

coaxial re-entrant well for a thermometer. Very pure air-free water is sealed in the cell, partially filling it. The NBS technique in preparing a cell for use is to freeze a mantle of ice along the thermometer well. This method further purifies the ice adjacent to the thermometer well. A thin layer of ice is then melted to provide the interface between pure water and pure ice, both of which are in contact with the vapor phase. Experiments carried out in 1942 showed that the triple point is very close to 0.0100 C (0.0097 C) and that its value as obtained with the triple-point cell is reproducible to within approximately 0.0001 deg C.

Next in importance to the ice point (or triple point) is the steam point, defined as the temperature of equilibrium between liquid water and its vapor under the standard pressure of 1,013,250 dynes per square centimeter (one atmosphere). The Bureau has conducted considerable research in an effort to make this temperature as reproducible as possible. While the steam point may be determined in a boiling-point apparatus left open to the atmosphere, corrections for atmospheric pressure, which is constantly changing, must be made; and precision is difficult to obtain in this way. The Bureau has therefore developed a controlled pressure system, employing a precision manometer, which has been used for the calibration of standard platinum resistance thermometers. A closed boiler, into which six thermometer wells extend, is connected to the precision manometer by a tube filled with helium. The manometer, located in a temperature-controlled pit, consists of a mercury column with a mercury cell at each end mounted on Hoke gage blocks.

Adjusting the difference in the heights of the two columns of gage blocks establishes the desired pressure, which is transmitted by means of the helium to the closed boiler. In order to determine the heights of the mercury surfaces in the mercury cells, the electrostatic capacity between the mercury surfaces and insulated metal plates above them is made a part of a beat-frequency oscillator circuit. After the manometer is adjusted, a change in pressure is detected by a change in the beat frequency. The pressure can be returned to its original value by the manual adjustment of a small piston in the helium system. With this equipment, a change in pressure equivalent to 0.00001 deg C at the steam point can be detected, and determinations of the steam point made during one day agree within 0.0001 deg C.

The International Temperature Scale is commonly used from its lowest limit, the normal boiling point of oxygen (−182.97 C or 90.19 K), to the highest temperatures measured. For temperatures below the oxygen point down to about 10 K, the Bureau maintains an auxiliary scale based on the resistance of capsule-type platinum resistance thermometers, some of which were calibrated using a helium gas thermometer. At the time it was established, this scale was made to agree with the thermodynamic scale as closely as possible. Capsule-type resistance thermometers are calibrated on this scale by the NBS for laboratories in the United States and in foreign countries.

The Bureau is now working to obtain the closest possible agreement between the Thermodynamic and the International Temperature Scale. To aid in this work, a *noise thermometer* developed at the University of Chicago has been set up at NBS to measure thermodynamic temperatures. The mean-square voltage due to thermal fluctuations in electron density in a resistor — usually referred to as thermal noise — is a function of the thermodynamic temperature of the resistor. By comparing the noise voltages across two resistors at different temperatures, it is possible to determine ratio of the temperatures of the resistors. The first measurements will be made of the temperature of the gold point, which is important both for the thermocouple and optical-pyrometer ranges of the International Temperature Scale.

Table 1—Fixed points[a] of the International Temperature Scale of 1948

Fixed point	Temperature, C
Oxygen point Temperature of equilibrium between liquid oxygen and its vapor	−182.97
Ice point (fundamental fixed point) Temperature of equilibrium between ice and air-saturated water	0.00
Steam point (fundamental fixed point) Temperature of equilibrium between liquid water and its vapor	100.00
Sulfur point Temperature of equilibrium between liquid sulphur and its vapor	444.60
Silver point Temperature of equilibrium between solid and liquid silver	960.80
Gold point Temperature of equilibrium between solid and liquid gold	1,063.00

[a]Under the standard pressure of 1,013,250 dynes/cm

A significant advance in the measurement of extremely high temperatures was the recent development of an iridium — (iridium-rhodium) thermocouple. Because of the high temperatures — up to about 3800 F — which prevail in the primary burning zones of turbojet and ramjet combustion chambers, conventional temperature-sensing instruments are not suitable for use in these applications. In preliminary studies, the new thermocouple has been found to withstand both the thermal and mechanical stresses incident to combustion-chamber operation, and heat-resistant supporting tubes and insulators are now being developed so that the device can be used in flight.

At very low temperatures (below 50 K) NBS research on thermometry has two major objectives: first, the determination of thermodynamic temperatures by means of a gas thermometer and, second, the development of convenient, sensitive, and reproducible secondary thermometers which can be calibrated by means of the gas thermometer. Since the development of a highly accurate gas thermometer for this purpose requires painstaking and time-consuming precision, the work on the secondary thermometer is being pursued concurrently. Resistance thermometers constructed of the semi-conducting elements, silicon and germanium, have proved to be extremely sensitive; in some cases the resistance changes more than 50 percent per degree. While satisfactory reproducibility still remains a problem, results of initial tests have been quite promising.

ASHVE Research Facilities on Busy Schedule

Environment Laboratory Being Used on a Two-Shift Schedule; New Rooms for Odor Studies Will Develop Needed Data

By I. W. Cotton, Chairman, Committee on Research

THE NEED for engineering information on panel heating — which can be supplied by the Society's new Environment Laboratory — is so great that operations of the facility have been on a two-shift basis in recent weeks. Inaugurated with special ceremonies last November, this facility for fundamental research by the ASHVE in many different phases of heating, ventilating and air conditioning has been in continuous operation since that time. Until the end of June, the work involved studies of heated ceiling panels, and early last month the first series of tests on floor panels was started.

The Society's Laboratory staff conducts the work according to a program set up by the ASHVE's Technical Advisory Committee on Panel Heating and Cooling, of which P. B. Gordon is chairman. This project is designed to develop essential information on heat transfer between a heated surface, the other surfaces surrounding the space in which the heated surface is located, and the air of the enclosure.

A progress report on results of the work was given at the 58th Annual Meeting in St. Louis last January, and it is expected that further results of the work will be given at the 59th Annual Meeting in Chicago next January.

The test data obtained with a heated ceiling show the ceiling temperature required to maintain a given air temperature at the 60 in. level for various temperatures of the unheated surfaces and various rates and temperatures of infiltration air.

Convection Greatly Affects Heat Output

Many of the tests made so far have shown how very important it is to develop further information on convection heat transfer for panel heating installations. As an extreme example of the effect of convection, one test was made in which a large fan was placed in one corner of the room, directed at the center of the ceiling and operated at low speed, giving 750 fpm air velocity directly in front of the fan. With the panel surface temperature and with the surrounding wall temperatures maintained the same as in a previous test with no fan in operation, the ceiling heat output in Btu per sq ft per hr was increased by about 50 percent. Though this type of test does not represent typical operation in an ordinary installation, the results indicate the great influence of convection on heat output from a heated ceiling panel.

Most of the tests have been made with uniform surroundings — the unheated walls and floor at approximately the same temperature — but some have been made with non-uniform surroundings. For example, tests have been made with two simulated outside walls containing three simulated windows held at about 25 F. These were made with and without furniture and drapes in the room. Though it is too early to give specific results, some very interesting information is being obtained.

Performance Better Than Anticipated

As far as the Environment Laboratory itself is concerned, it has performed better than anticipated. It has proved the value of the careful thought that went into its planning and the careful work that went into the construction and the instrumentation. Cleveland — like many other parts of the country — has experienced very warm weather this summer. In spite of this, the control and operation of the room is such that at no time was it necessary to stop or even interrupt operations because of the weather.

A test crew of two men is able to operate the equipment, take data and work up the preliminaries of the test results. Under such a plan 29 complete test runs were successfully made in 17 working days in the month of June. The morning crew, finding the room set up at the desired conditions, can complete the first test by about noon. Some slight changes are then made in the operating conditions and a second test is made in the afternoon or early evening. When the second test has been completed the afternoon crew sets the conditions ready for the next morning's test.

In the ceiling panel tests with no infiltration air, it was possible to obtain complete heat balances on the room for every test. However, this proved rather more difficult to do when infiltration air was introduced, since — although it is easy to control the rate, temperature and place at which the infiltration air is introduced into the room — it is by no means as simple to control the way in which the air leaves it. However, taking all things into consideration, it is remarkable how close a heat balance can be struck and how low the percentage of unaccounted for heat is in each test.

Getting Ready to Start Odor Studies

Despite the fact that the Environment Laboratory is less than a year old, the ASHVE is also about ready with another major research facility — the new odor rooms, at Cleveland. Probably the question of odors in buildings — and how to correct for them — is one of the most mysterious ones facing air conditioning and ventilating engineers and contractors. The ASHVE studies on odors are certain to be of great public interest as well as of practical value to the industry, and to everyone engaged in the design, operation, or maintenance of almost any type of building.

The specially-constructed odor rooms have been carefully arranged to allow obtaining very practical and useful information on the odor problem. In the first tests to be conducted in them, it is planned to maintain one chamber at a *normal* condition and to keep the other one at various temperatures and humidities. The objective of this first group of studies thus will be to determine what — if any — effects various temperatures and humidities have on the odor *nuisance*.

ASHVE Research Progress

ASHVE research — in its own Laboratory at Cleveland, and in the many cooperating institutions — is a big program and an important program. It's a program which because of its extent and its variety is difficult to summarize. These few comments on just two of the Society's research facilities and the work they can do, give but an inkling of its scope.

That the ASHVE's studies of the fundamentals of heating, ventilation and air conditioning are basic to our industry and to good engineering and installation is well-proved by the amount of information made available in our meeting papers, our JOURNAL, our TRANSACTIONS, and THE GUIDE — the standard handbook of this ever-growing field of engineering, which is in daily use all over the world.

Chicago skyline with Conrad Hilton Hotel at left

Let's Go To Chicago

CHICAGO, second largest city in the nation, situated on the southern tip of Lake Michigan, will be the scene of the 59th Annual Meeting of THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS from January 26 to 29, 1953. Easily reached from all points of the compass, Chicago, railroad center of the United States, is served by 33 railroads, 15 airlines and an excellent network of fine highways. The city is laid out on a grid iron pattern, thus making it easy to get from one point to another quickly by subway, streetcar, elevated or bus. It has numerous beautiful parks, and featured attractions are the Garfield Park Conservatory, the Brookfield Zoo, and Lincoln Park Zoo. It has some of the country's finest public buildings, such as the Adler Planetarium, the Art Institute, Chicago Academy of Sciences, Chicago Historical Society, Chicago Natural History Museum, Museum of Science and Industry, and the Shedd Aquarium. With many beautiful buildings, excellent stores, numerous fine hotels, theaters and other places of amusement, Chicago offers the visitor many worthwhile attractions.

The Conrad Hilton, the world's largest hotel, will be meeting headquarters. The Meeting and Exposition visitors will be housed in nearly all of Chicago's other famous hotels which have reserved space to accommodate members and their guests for what will undoubtedly be the biggest Annual Meeting ever held.

The *11th International Heating, Ventilating and Air Conditioning Exposition* will be held in conjunction with the meeting. The Exposition will take place at the International Amphitheatre on Chicago's south side, familiar to everyone as the scene of the recent Republican and Democratic National Conventions. This will be the largest heating, ventilating and air conditioning exposition ever held with over 300 exhibitors taking part. The Society will have space in the show and will feature some of its current research projects. Be sure to visit Booth 905.

Illinois Chapter will serve as hosts for the meeting and the Committee on Arrangements will be under the direction of W. A. Kuechenberg, general chairman. Work has already started on the program and the entertainment features. Prof. E. R. Queer, chairman of the Program and Papers Committee, announces that the technical sessions will present a large number of excellent engineering and research papers including several from the Society's Research Laboratory and cooperating institutions.

All roads lead to Chicago in January 1953 and members are urged to mail hotel reservation forms to the hotel of their choice immediately in order to be assured of obtaining the desired accommodations. The official forms were mailed to all members in July.

The Committee chairmen and the entire Illinois Chapter are looking forward to welcoming members, their wives, and guests, to Chicago for the 59th Annual Meeting in January.

Committee on Arrangements

W. A. Kuechenberg, *General Chairman*
G. W. Bornquist, *Vice Chairman*
Honorary Chairmen
H. M. Hart
S. R. Lewis
A. C. Willard
M. W. Bishop, *Chapter President*
G. V. Zintel, *Chapter Secretary*
Banquet: H. G. Chapin, *Chairman*
Entertainment: J. S. Kearney, *Chairman*
Finance: G. G. Freyder, *Chairman*
Ladies: Mrs. G. W. Bornquist, *Chairman*
Plant Inspection: C. M. Barnes, *Chairman*
Publicity: T. V. Johnson, *Chairman*
Reception: H. G. Gragg, *Chairman;* Herbert Kreisman, *Co-Chairman*
Sessions: J. F. Cummiskey, *Chairman*

Centennial of Engineering

September 3 to 13 marks the Centennial of Engineering in Chicago, Ill., with 40 participating societies taking part in this great congress of engineering societies. The Centennial marks the 100th Anniversary of the organization of the **American Society of Civil Engineers** which is holding its special centennial ceremonies in the Conrad Hilton Hotel.

The ASHVE participation in this engineering congress is with the **ASME** in its fall meeting sessions on fuels and heat transfer at the Hotel Sheraton, September 10 and 11.

ASHVE Pres. Ernest Szekely, Milwaukee, Wis., is participating in the International Presidents' Luncheon on Monday, September 8. The Committee on Research has scheduled its fall meeting at the Conrad Hilton Hotel on Saturday, September 6.

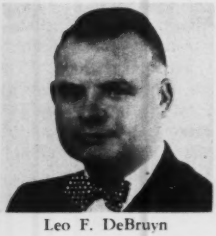
Other Centennial events include symposia on many topics and a daily pageant, **Adam to Atom**, dramatizing historical American invention and engineering skills at the auditorium of the Museum of Science and Industry. The Centennial Luncheon, September 10, at the Conrad Hilton Hotel, features the presentation of the John Fritz and Herbert Hoover medals.

FIRST SPECIAL BRANCH CHARTERED IN SWITZERLAND

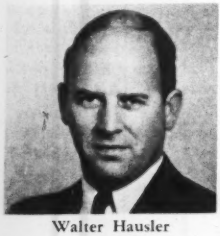
Switzerland, as a small nation, is fortunate to have an active membership in THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS that has organized and functioned on a national basis as a proposed special branch of the parent Society. Over 20 members of the Society, prominent in their profession and residing in various industrial centers, now comprise the group that petitioned the Council of the Society for a local organization. Favorable action on their request to organize a special branch is creating a great deal of interest among the members in Switzerland. They now have an opportunity to meet as an organization where formerly no group relationship existed for discussion of professional problems and exchange of ideas. The new Switzerland Special Branch has planned a two-day excursion, September 5-6, for their first general meeting at one of the famous Swiss Alpine resorts. At that time, they expect to receive their charter and carry out plans for a permanent organization and enjoy a program of professional papers and social festivities.

In July it was a pleasant experience for M. F. Rather and Mrs. Rather of New York, to visit with Leo F. DeBruyn, president, and Walter Hausler, secretary-treasurer, of the Switzerland Special Branch in Zurich, who were cordial and considerate hosts at a delightful visit and dinner at Hotel Eden-au-Lac. They described their organization activities and mentioned the enthusiastic cooperation they received from Walter Sennhauser, as well as other members active in this work. It was Mr. Rather's feeling that all of this enthusiasm to bring together these men in an active professional engineering Society should contribute to all members means for assimilating data and standards from European sources that will be of benefit to those in the parent organization.

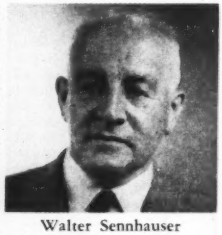
Mr. and Mrs. Rather had spent a month visiting European countries, including England, France, Holland, Belgium and Italy. During their travels they visited a number of Society members in these countries.



Leo F. DeBruyn



Walter Hausler



Walter Sennhauser

RESEARCH STAFF APPOINTMENTS

I. W. Cotton, chairman of the Committee on Research, has announced the appointment of M. L. Erickson as a research fellow in the Society's Research Laboratory. Mr. Erickson, who at present is a research fellow at the Engineering Experiment Station of the University of Minnesota, will assume his new duties at the Laboratory on September 15. His first assignment will be a study of the thermal properties of building materials, which was approved by the Society's Committee on Research at the Semi-Annual Meeting in Spring Lake, N.J., on the recommendation of the TAC on Insulation.

Mr. Erickson graduated from North Dakota State College in 1949 with a bachelor of science degree, and received a master of science degree in mechanical engineering from the University of Minnesota in 1951. From September 1949 to July 1950, he was a teaching assistant in the Department of Mechanical Engineering at the University of Minnesota; and since July 1950, he has held a research fellowship at the Engineering Experiment Station there and recently developed a construction manual for the use of layman builders in Alaska.

The recent addition of two engineers to the laboratory staff was also announced. They are Aydin Umur, a graduate of Robert College and Engineering School, Istanbul, Turkey, now a graduate student at Case Institute of Technology, Cleveland; and D. J. Vild, graduate of Case Institute of Technology this June. Mr. Umur is assisting on panel heating studies and Mr. Vild is assisting in work on shading devices and in other work under the general direction of the TAC on Cooling Load.

Summary of Chapter Meetings*

• *ARKANSAS*: Herman Cumnock introduced the speaker of the evening, Jack Wilson, of the Little Rock Municipal Water Works. Mr. Wilson's talk, entitled *Water Supply Problems*, covered some of the problems confronting a modern city in acquiring and maintaining an adequate water system. Four aspects of this problem, he stated, are: (1) public health; (2) fire protection; (3) street flushing; and (4) refrigeration and air conditioning.

In regard to Little Rock, Mr. Wilson explained that the population is not only increasing but the per capita water consumption is constantly growing. He went on to explain that when the present water system was designed and built 17 years ago, it was considered adequate for 40 years but it is already insufficient to meet the city's needs. Mr. Wilson elaborated on some other cities' problems and their possible cause; for instance, a flat rate charge in New York contributes to water waste and resultant shortage. Air conditioning units account for a large amount of water consumption, he continued, and he then gave some figures to substantiate this.

In the year 1951 the maximum water main temperature was 77 F in Little Rock, the minimum was 45 F and the mean 63 F. A five-ton air conditioning unit at 70 F entering water temperature uses 277 gph and 80 F entering water temperature uses 432 gph, according to Mr. Wilson. This is reflected in the metered charges — 70 F monthly bills averaged $21.60 and 80 F monthly bills averaged $33.90. A brief question and answer period followed the talk. Attendance 28. Attendance ratio 0.54.

*Note: The attendance ratios shown represent the membership attendance divided by the chapter membership. These ratios will be useful as a partial indication of interest shown by local chapter members in various types of subjects programmed by the various chapters and may be useful in deciding on subjects for chapter meetings.

• *CENTRAL OHIO*: The annual spring outing of the Chapter was held at the Columbus General Depot Officers' Club on June 12 with 64 members and guests in attendance. Members and guests engaged in various forms of entertainment, including golf, horse shoes, dart games, and card games. Following the afternoon's activities an excellent steak dinner was served and was enjoyed by all.

• *GOLDEN GATE*: The election of officers was held at the Chapter's June meeting with the following results: *President*—T. J. White; *Vice President*—J. E. Murray; *Secretary*—Eric Roberts; *Treasurer*—D. E. McLeod; *Board of Governors*—F. K. Crouch, H. L. Duncan, and T. J. Janes. K. F. Baldwin presented retiring President Janes with a past president's pin.

G. F. Landgraf, vice president in charge of engineering, Trion, Inc., McKees Rocks, Pa., spoke on *Electrostatic Precipitation*. In his talk, Mr. Landgraf covered the development of electrostatic filtration equipment, and he also discussed the various new types of equipment. He made special mention of the fact that the British *Institution of Heating and Ventilating Engineers* had completed tests which indicated that bacteria kills up to 99 percent at optimum filter velocity.

During the business meeting, which preceded the talk, reports were presented by the various committee chairmen. Attendance 63.

• *NORTH TEXAS*: The Chapter's June meeting was a social affair held in the Picnic Arena at Fair Park. Following a cold, buffet-type dinner, which was thoroughly enjoyed by all, the evening was devoted to dancing and to various types of games. Attendance 286.

• *NORTH TEXAS*: The speaker at the July meeting was T. J. Harriman, assistant chief engineer for Bell Aircraft Corp. Mr. Harriman, in speaking on *Helicopters*, traced the history of the helicopter and summarized its present stage of development as comparable to that of the airplane 10 years ago. He stated that World War II and the Korean conflict have been important factors in the progress of its development. The talk dealt largely with design problems;

John R. Allen Memorial Library

The ASHVE Committee on Research gratefully acknowledges the following gifts to the John R. Allen Memorial Library, which is maintained at the Society's Research Laboratory, 7218 Euclid Ave., Cleveland 3, Ohio.

Proceedings of the National District Heating Association, Vol. XL, 1949, Pittsburgh, Pa. *National District Heating Association*, 1952. Gift of the *Association*.

Heating, Ventilating, and Air Conditioning Fundamentals, by William H. Severns and Julian R. Fellows, Second Edition, New York, John Wiley and Sons, Inc., 1950. Gift of the authors.

The presentation of textbooks and pamphlets in the field of heating, ventilating, and air conditioning and allied fields, by authors and others, will be welcomed by this library. Suitable book plates carry the name of the donor and date of the gift.

the principal problem at the time is that the advancing rotor blade has a higher wind speed than the retreating blade as the helicopter moves forward. Currently, the problem is being handled by increasing the pitch on the retreating blade. Mr. Harriman stated that he expects that the convertible type will develop more in the near future. This type helicopter swings its lift rotor ahead to become the propellor after the desired altitude is obtained. Small wings support the plane's weight. However, he added, this design is plagued with many perplexing mechanical problems.

The meeting was called to order by Pres. R. E. Allison in the Melrose Hotel. Attendance 80. Attendance ratio 0.56.

Candidates for Membership

The Society's By-Laws require that all applications for membership or advancement are to be sent to the Executive Secretary and the names of applicants and their references shall be printed in the next issue of the JOURNAL of the Society, or mailed to all members. When the replies are received from references the Candidate's application shall be submitted to and acted upon by the Admission and Advancement Committee as soon as possible.

When the Admission and Advancement Committee has acted favorably upon a Candidate's application and assigned his grade, the Council shall confirm the election of the proposed Candidate for membership. During the past month there have been 50 applications for membership, including 3 reinstatements; in addition 8 advancements have been received. The names of these men and their sponsors are published in the following list.

Members are requested to scrutinize the list with care. The Admission and Advancement Committee, and in turn, the Council, urge members to assume their share of responsibility of receiving these candidates into membership by advising the Executive Secretary promptly of any whose eligibility for membership is in any way questioned.

All correspondence in regard to such matters is strictly confidential, and is solely for the good of the Society, which it is the duty of every member to promote.

Unless objection is made by some member by September 30, 1952, these candidates will be voted upon by the Council. Those elected to membership will be notified by the Executive Secretary immediately after election.

Note: †Reinstatement. *Non-member. △Advancement

Alabama

BUEHRER, N. B., Vice Pres., F. J. Evans Engineering Co., Birmingham. REFERENCES: V. G. Hopping*, M. E. Linn, D. M. Mills, J. J. Tyson*.

California

CODDINGTON, B. A., Partner, Coddington Co., San Francisco. REFFERENCES: C. H. Bazille, F. W. Hook, W. S. Peters, N. H. Peterson.

HAMEL, J. S., Cons. Engr., Los Angeles. REFERENCES: Carlyle Artran, E. C. Evans, A. L. Ottum, H. P. Sheldon.

PYLE, R. F., Vice Pres., Hess-Greiner & Polland, Los Angeles. REFERENCES: F. G. Gardner, M. C. Greiner, A. J. Hess, H. F. Ulovec.

△TAYLOR, R. C., Br. Office Mgr., Herman Nelson Div., American Air Filter Co., Inc., Los Angeles. REFERENCES: N. N. Dahl, B. R. Miller, Carl Raymond, H. P. Sheldon.

WOODS, C. S., JR., Engr., Hess-Greiner & Polland, Los Angeles. REFERENCES: E. C. Evans, M. C. Greiner, A. J. Hess, Fritz Honerkamp.

Colorado

△COOK, H. V., Partner, Louis Cook Plumbing Co., Denver. REFERENCES: J. J. Johnson, H. W. Marshal, J. F. Mohan, B. H. Spurlock, Jr.

Connecticut

BURGESS, J. D., Engr., Hubbard, Lawless & Blakeley, New Haven. REFERENCES: H. J. Blakeley, Allen Hubbard, A. J. Lawless, S. R. Osborne.

District of Columbia

†GEDNEY, K. H., Consultant, Washington. REFERENCES: E. K. Campbell, E. K. Campbell, Jr., F. F. Dodds, M. M. Rivard.

Illinois

ABRAHAM, W. J., Engr. & Estimator, R. B. Hayward Co., Chicago. REFERENCES: H. G. Gragg, G. D. Haberer, W. A. Kuechenberg, S. M. Trumbo.

△ANDERSON, R. D., Mech. Designer, Pioneer Service & Engineering Co., Chicago. REFERENCES: L. M. Davis*, W. C. Drummond*, R. L. Geiger, E. Uhlendorf*.

BELMONTE, S. J., Draftsman, Pioneer Service & Engineering Co., Chicago. REFERENCES: R. D. Anderson, J. V. Bartucci*, L. M. Davis*, J. E. Tully*.

△COFFEY, G. B., Div. Mgr., A. M. Byers Co., Chicago. REFERENCES: C. M. Burnam, Jr., H. G. Chapin, J. S. Kearney, A. O. May.

HARON, A. S., Mech. Designer, Pioneer Service & Engineering Co., Chicago. REFERENCES: R. D. Anderson, L. H. Holder, D. W. Nelson, D. E. Wright*.

†LICHTENFELD, S. L., Mech. Selection Engr., Blaw-Knox Construction Co., Chicago. REFERENCES: Frederick Breyer, E. W. Mautner, Fred Meyer*, Herbert Zaltzman*.

MITCHELL, E. L., District Sales Engr., McDonnell & Miller, Inc., Chicago. REFERENCES: C. J. Baker, J. W. James, E. N. McDonnell, N. W. Swanson.

SANTORO, L. L., Asst. Supt., Armour Research Foundation, Chicago. REFERENCES: H. G. Gragg, W. L. Long, L. H. Streb, R. J. Thygerson, Jr.

Indiana

BEVILLE, P. T., Designer, Hall-Neal Furnace Co., Indianapolis. REFERENCES: Cornell Bodell, L. W. Clark, G. S. Gombert, R. A. Hoyt.

LOGGINS, J. R., Sales Mgr., Indiana Heating Corp., Indianapolis. REFERENCES: F. A. Arzet, J. T. Hardin, J. W. Jackson, E. C. Keime.

Iowa

PANDISCIO, A. J., Application Engr., Westinghouse Electric Corp., Sturtevant Div., Des Moines. REFERENCES: E. R. Anderson, W. B. Barnard, R. C. Moorehead*, B. A. Schwirtz.

Kansas

WAGNER, C. E., Mech. Engr., Williamson-Loebsack & Assocs., Topeka. REFEREN-

CES: J. H. Anderson, C. S. Graves, V. H. Loebsack, L. P. Moore.

Louisiana

COLEMAN, J. G., JR., Sales Engr., Southern Heater Co., Inc., New Orleans. REFERENCES: Ralph Elizardi, Burt Lomax, Jr., B. L. Palmer, H. N. Stall.

Massachusetts

JOHNSON, R. E., Mfrs. Repr., Bryant Heater Div., Cambridge. REFERENCES: R. W. Campbell*, L. F. Davis*, F. W. Lippert*, P. W. Princi.

ROBERTS, G. T., JR., Chief Mech. Engr., Hayden, Harding & Buchanan, Boston. REFERENCES: F. H. Brigham, O. J. Campia, W. H. Shipp, C. R. Swaney.

Minnesota

△OSLUND, D. L., Mech. Engr. & Sr. Htg. Engr., Dept. of Buildings, Minneapolis. REFERENCES: H. M. Betts*, J. A. Craig, L. C. Gross, A. F. Hovda*.

Mississippi

TAYLOR, J. W., Cons. Engr., Jackson. REFERENCES: Jim Coleman*, R. E. Cope*, Burt Lomax, Jr., R. S. Oyer.

Missouri

△CASSING, E. F., Field Engr., General Htg. & Cooling Co., Kansas City. REFERENCES: D. M. Allen, J. P. Roesing, C. W. Schumacher, C. V. Werner.

ZAHNER, A. A., Engr., Burns & McDonnell Engrg. Co., Kansas City. REFERENCES: A. E. Bodner*, J. C. Lasmacht*, A. B. Luhnow, Jr., W. N. Marshall, Jr.*.

New Jersey

BERGER, M. R., Application Engr., Worthington Corp., Harrison. REFERENCES: D. B. Heffron, C. H. Hollister*, Mel Ramsey*, H. E. Wood*.

New York

LETO, JOSEPH, Naval Architect, Dept. of the Navy, Brooklyn. REFERENCES: Max Bier*, Louis Coppolino*, J. L. Hoyer, William Wranovics*.

ROCK, SHELDON, Draftsman, Voorhees, Walker, Foley & Smith, New York. REFERENCES: Stanley Dicker, Nathan Feder, Bernard Kaplan, Irving Silverman.

Ohio

PETERS, C. R., Partner, The Duo Co., Marion. REFERENCES: A. I. Brown, G. D. Hudelson, E. W. Koeppen*, M. L. Smith*.

STOCKWELL, JOE, Engr., Harold N. Hermann & Assocs., Cincinnati. REFERENCES: J. J. Bechtol, H. N. Hermann, E. J. Richard, G. V. Sutfin.

Attention!!
Members of ASHVE
Moved or Moving?

Each month mail is returned BECAUSE you overlooked advising us of the change in your address.

The return mail is a loss to you, and an added expense to the Society.

In your own interest, will you please advise us at once of any change in your business or home address, indicating which is your mailing address.

ASHVE Headquarters
62 Worth St.
New York 13, N. Y.

Oklahoma

COLEN, A. R., Engr., Appliance Distributors, Inc., Oklahoma City. REFERENCES: Jerry Anderson*, T. J. Boyett, Rodney Keif*, Robert Morris*.

KRAFT, W. W., Dir. of Physical Plant, University of Oklahoma. REFERENCES: W. J. Collins, Jr., E. F. Dawson, G. T. Donceel, W. W. Frankfurt.

†LOEFFLER, LOUIS, JR., Gen. Mgr., Federal Supply Co., Oklahoma City. REFERENCES: R. G. Dolan, G. T. Donceel, F. X. Loeffler, Sr., R. E. Swan.

OLLER, P. F., JR., Engr., Oller Heating Co., Oklahoma City. REFERENCES: W. J. Collins, Jr., F. X. Loeffler, Jr., J. R. Patten, R. E. Swan.

STEWART, W. H., Owner, W. H. Stewart Co., Oklahoma City. REFERENCES: W. J. Collins, Jr., G. E. Ervin, D. R. Froth, R. E. Swan.

THOMASSON, R. E., Owner, Manoy Engineering Co., Oklahoma City. REFERENCES: W. J. Collins, Jr., F. X. Loeffler, Sr., W. C. McNeill, A. C. Shelley.

WEBB, S. S., Mfrs. Repr., Oklahoma City. REFERENCES: W. J. Collins, Jr., R. G. Dolan, W. C. McNeill, W. T. Milam.

WICKLINE, L. E., Commercial Sales Engr., Minneapolis-Honeywell Regulator Co., Oklahoma City. REFERENCES: J. H. Carnahan, W. J. Collins, Jr., W. T. Milam, R. E. Swan.

Pennsylvania

BITZER, R. L., Engr., R. D. Bitzer Co., Philadelphia. REFERENCES: M. E. Barnard, C. J. Forve, E. K. Wagner, P. H. Yeomans.

LEATHEM, G. M., Mfrs. Repr., Pittsburgh. REFERENCES: R. E. Daume, W. C. Gottschall, V. A. Reed, Jr., E. H. Riesmeyer, Jr.

PROIE, G. A., Engr., Proie Brothers, Inc., Pittsburgh. REFERENCES: A. J. Luppino, M. H. Prestia, John Proie, E. C. Smyers.

SCHOCK, A. C., Engr., Dravo Corp., Pittsburgh. REFERENCES: J. H. Allison, E. C. Hach, B. B. Reilly, G. H. Strachan.

WOLFE, L. H., Sales Engr., Dravo Corp., Philadelphia. REFERENCES: E. H. Bowes*, H. K. Hicks*, M. L. Hicks*, H. A. Pietsch.

Texas

△POOLE, J. A., Partner, Rivoire & Poole, Cons. Engrs., Houston. REFERENCES: D. M. Mills, O. G. Rivoire, R. J. Salinger, R. F. Taylor.

Wisconsin

△ANDERSON, E. R., Application Engr., Westinghouse Electric Corp., Sturtevant Div., Milwaukee. REFERENCES: D. W. Davis, Jr., E. W. Gifford, W. L. Hunken, T. A. Kuck.

Canada

BYRON, R. A., Fiberglas Insulation Repr., LaSalle Builders Supply, Ltd., Montreal. REFERENCES: G. A. Rogers*, W. P. Seath*, W. R. Sirman*, R. Sproule*.

COLBORNE, W. G., Research Asst., Queen's University, Kingston. REFERENCES: H. G. Conn, M. K. Fahnestock, A. D. Kent, R. W. Roose.

GREEN, J. W., Mgr., Ottawa Office, Canadian Sirocco Co., Ottawa. REFERENCES: C. W. Johnson, R. R. Noyes, H. R. Roth, E. H. Terrance.

LAYTON, R. E. J., Chief Mech. Engr., T. Pringle & Son, Ltd., Montreal. REFERENCES: R. G. Barbour, J. C. Hennesey, B. J. Horsburgh, H. G. S. Murray.

LEMIEUX, G. A., Engr., Minneapolis-Honeywell Regulator Co., Ltd., Montreal. REFERENCES: R. Bilodeau*, O. M. Cepella*, D. L. Lindsay, Ivan McDonald.

NORRIS, C. F., Design Engr., C. D. Howe Co., Ltd., Montreal. REFERENCES: P. N. B. Evans*, R. R. Noyes, R. W. Stedman*, L. C. A. Walford.

PARTINGTON, J. D., Sales Repr., Arthur S. Leitch Co., Ltd., Ottawa. REFERENCES: K. D. Leitch, A. A. J. Liddiard, J. McWilliams*, W. J. Usher.

PELLETIER, J. A., Asst. Resident Engr., The Rankin Co., Ltd., Montreal. REFERENCES: S. J. Becker, W. U. Hughes, R. A. Rankin*, P. P. Vinet.

ROBINSON, W. U., Vice Pres., The Moulton Co., Montreal. REFERENCES: B. J. Horsburgh, G. E. Perras, G. H. Powell, J. D. Ross.

TURNER, P. W., Draftsman, James P. Keith & Assocs., Montreal. REFERENCES: J. P. Fitzsimons, J. P. Keith, J. L. Knight, Ivan McDonald.

Germany

BRADTKE, FRANZ, Engr., Technische Universitat Berlin, Berlin-Charlottenburg. REFERENCES: F. E. Giesecke, Walter Liese*, W. Raib*, E. Sprenger*.

Southern Rhodesia

SEARLE, J. G., Br. Mgr., Matthew Hall & Co., Ltd., Bulawayo. REFERENCES: G. Allen, H. L. Egerton, S. Kindler, S. A. Stevens.

OBITUARIES

O. J. Prentice

OLIVER J. PRENTICE
Chicago, Ill.

O. J. Prentice, advertising and public relations counsellor and formerly advertising manager for C. A. Dunham Co., Chicago, died on July 14, 1952. He was stricken with a heart attack while attending a *National District Heating Association* meeting in early June at Sky Top, Pa. A Chicago resident for 63 years, Mr. Prentice was born in England in 1867 and attended English schools.

Mr. Prentice had been in advertising and public relations work for over 50 years. He started with Critchfield and Co. in Chicago in 1894. From 1907 to 1920, Mr. Prentice was western representative for N. W. Ayer and Son of Philadelphia, when he joined the C. A. Dunham Co., which he served until his retirement in 1949.

Mr. Prentice was a Life Member of the Society and active in the Illinois Chapter, serving as its president in 1946-47. He was prominent in business organizations closely identified with the heating field; a member of the *National Association of Building Owners and Managers*, the *National District Heating Association* and the *National Association of Power Engineers*. He became a member of the *Chicago Association of Commerce and Industry* in 1908, was appointed to the Illinois Committee in 1922, served one year as chairman, and was a Life Member of the Committee.

Surviving are three daughters, Mrs. Agnes Smith, Mrs. Faith Hale, and Mrs. Marie Bosworth; five grandchildren and two great grandchildren, to whom the Officers and Council of the Society extend their deepest sympathy.

ALLAN F. FERRIS
St. Louis, Mo.

A. F. Ferris, Ferris and Hamig, Consulting Engineers of St. Louis, died suddenly on June 28, 1952. Mr. Ferris was prominent in engineering circles in St. Louis in heating, ventilating, air conditioning, and plumbing for commercial and industrial buildings. Born in Boston, Mass., on November 5, 1900, he attended Washington University in St. Louis and served in World War I. He was formerly associated with Hester-Bradley Co., Elliott and Barry Heating Co., and John D. Falvey, Consulting Engineer.

A member of the Society since 1945, he was also a member of the *National Society of Professional Engineers*, the *American Society of Refrigerating Engineers*, the *Missouri Society of Professional Engineers*, and the Engineers Club of St. Louis.

The Officers and Council extend to his widow and three children sincerest sympathy in their bereavement.

BERTRAM C. CANDEE
Buffalo, N. Y.

B. C. Candee, partner with Beman and Candee, consulting engineers, Buffalo, N.Y., in heating, ventilating, air conditioning, plumbing and electrical work, died on June 29 after an illness of two months. Born in Dunkirk, N.Y., on March 12, 1870, Mr. Candee attended Cornell University and had diversified experience as a draftsman, designer and works superintendent for several firms in Western New York. He became associated with Beman and Candee in 1920 and was very prominent in engineering circles on the Niagara Frontier. He was a licensed professional engineer in the state of New York.

B. C. Candee

Mr. Candee was a Life Member of the Society and president of the Western New York Chapter in 1937-38. He was treasurer of this Chapter from 1938 until his death. He was a 33rd degree Mason.

He is survived by his wife, Mrs. Augusta D. Candee, and two daughters, Mrs. Gardner F. Erdle, and Mrs. Edith B. Macnish, to whom the Officers and Council extend their sincere sympathy.

ELMER J. MUEHLIG
Denver, Colo.

Word has just been received by the Society of the death of E. J. Muehlig, Rocky Mountain Area Construction Superintendent for the F. W. Woolworth Co., on May 10, 1952, in Denver. Mr. Muehlig, a member of the Society since 1945, was born on March 8, 1892 in Buffalo, N. Y., and attended Buffalo schools. He began work with Coalson-Hudson, Architects, in Buffalo, and in 1917 joined F. W. Woolworth in Buffalo, later moving to Denver. In his capacity as construction superintendent, he designed, estimated and supervised the remodeling and construction of over 100 Woolworth stores in the west including the recently completed Denver store, which is the fifth largest Woolworth store in the United States.

Mr. Muehlig is survived by his widow, Mrs. Florence W. Muehlig, two daughters, Mrs. Dean Razee and Mrs. Q. R. Schmitt and a son, Allen E. Muehlig, to whom the Officers and Council extend their deepest sympathy.

THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Headquarters: 62 Worth St., New York 13, N. Y. Research Laboratory, 7218 Euclid Ave., Cleveland, Ohio

OFFICERS

President.....Ernest Szekely
First Vice President.....Reg F. Taylor
Second Vice President.....L. N. Hunter
Treasurer.....J. Donald Kroeker
Executive Secretary.....A. V. Hutchinson
Technical Secretary.....Carl H. Flink

COUNCIL

Ernest Szekely, *Chairman;* Reg F. Taylor, *Vice Chairman.*

Three Years: M. K. Fahnestock, P. B. Gordon, R. T. Kern, D. M. Mills.

Two Years: J. H. Fox, N. H. Peterson, B. H. Spurlock, Jr.; and B. L. Evans (*one year*).

One Year: J. E. Haines, J. W. James, E. R. Queer, G. B. Supple, L. E. Seeley.

ADVISORY BOARD

L. E. Seeley, *Chairman;* Homer Addams, Lester T. Avery, M. F. Blankin, S. E. Dibble, S. H. Downs, E. O. Eastwood, W. L. Fleisher, H. P. Gant, F. E. Giesecke, E. Holt Gurney, L. A. Harding, H. M. Hart, C. V. Haynes, D. D. Kimball, G. L. Larson, S. R. Lewis, A. J. Offner, F. B. Rowley, A. E. Stacey, Jr., G. L. Tuve, A. C. Willard, C.-E. A. Winslow, and B. M. Woods.

COUNCIL COMMITTEES

Executive: L. E. Seeley, *Chairman;* L. N. Hunter, Reg F. Taylor.

Sub-Committee: H. E. Sproull, *Chairman;* C. S. Koehler, Reg F. Taylor.

Finance: J. W. James, *Chairman;* N. H. Peterson, E. R. Queer, J. Donald Kroeker, *Ex-Officio.*

Ways and Means: C. E. Price, *Chairman;* I. W. Cotton, J. A. Cutler, M. K. Fahnestock, E. R. Queer.

Membership: J. E. Haines, *Chairman;* R. T. Kern, D. M. Mills.

Program and Papers: E. R. Queer, *Chairman;* J. H. Fox, P. B. Gordon.

Standards: L. N. Hunter, *Chairman;* B. H. Spurlock, Jr., G. B. Supple.

GENERAL COMMITTEES

Admission and Advancement: A. W. Edwards, *Chairman (one year);* Roswell Farnham *(two years),* G. D. Winans.

Publication: P. J. Marschall, *Chairman;* R. P. Cook, Linn Helander.

Guide: B. H. Jennings, *Chairman;* D. B. Anderson, W. E. Long *(one year);* W. S. Harris, F. J. Nunlist, Jr., C. D. Shields *(two years);* P. R. Achenbach, R. E. Cherne, A. B. Newton *(three years);* I. W. Cotton, *Ex-Officio.*

Charter and By-Laws: E. L. Crosby, *Chairman (one year);* G. W. F. Myers *(two years);* G. D. Winans *(three years).*

F. Paul Anderson: Reg F. Taylor, *Chairman;* C. O. Mackey, G. D. Winans, M. S. Wunderlich, A. J. Offner.

Chapter Relations: G. B. Supple, *Chairman;* D. W. Blair, J. S. Burke, C. R. Davis, A. J. Hess, C. H. Randolph, J. H. Ross.

Chapters Conference: A. J. Hess, *Chairman;* G. W. Bornquist, *Vice Chairman;* W. J. Collins, Jr., *Secretary.* Members and alternate members selected by local chapters are respectively:

ATLANTA: F. A. Player—J. G. Croley
BALTIMORE: F. M. Hewitt—G. B. Priester
CENTRAL NEW YORK: F. E. Krell—D. L. Mills
CENTRAL OHIO: R. S. Curl—A. D. Bogen
CINCINNATI: J. J. Bechtol—H. E. Russell
CONNECTICUT: A. J. Lawless—T. L. Arnold
DELTA: J. S. Burke—Walter Cooke
EMPIRE STATE: D. A. Carofano—
GOLDEN GATE: J. E. Murray—T. J. Janes
ILLINOIS: G. W. Bornquist—M. W. Bishop
INDIANA: C. F. A. Locke—F. C. Barton
INLAND EMPIRE: J. A. Doyle—P. J. Favre
IOWA: C. H. McGuiness—R. H. Schnell
KANSAS: O. P. Bullock—Charles Yoe
KANSAS CITY: W. A. Reichow—G. H. Stoffer
MANITOBA: W. J. Atkinson—A. K. Piercy
MASSACHUSETTS: John Bonner—G. D. Fife
MEMPHIS: C. S. Fisher—H. H. Wilson
MIAMI VALLEY: C. D. Weaver, Jr.—D. L. Bergman
MICHIGAN: G. W. Akers—C. A. Strand
MINNESOTA: E. F. Snyder, Jr.—William Sturm
MONTREAL: J. G. Chenevert—W. G. Hole
NEBRASKA: S. W. Black—O. J. Smith
NEW YORK: Ernst Graber—P. B. Gordon
NORTH CAROLINA: R. M. Warren—C. Z. Adams
NORTH TEXAS: R. E. Allison—P. N. Vinther
NORTHEASTERN OKLAHOMA: V. W. Miles—J. N. Watt
NORTHERN OHIO: R. E. Sherman—J. M. Black
NORTHERN PIEDMONT: C. Z. Adams—
OKLAHOMA: W. J. Collins, Jr.—F. X. Loeffler
ONTARIO: J. H. Ross—J. H. Fox
OREGON: K. H. Hanson—E. R. Lokey
PACIFIC NORTHWEST: W. B. Pride—R. C. Lewis
PHILADELPHIA: F. H. Buzzard—C. J. Forve
PITTSBURGH: B. B. Reilly—E. H. Riesmeyer, Jr.
ROCKY MOUNTAIN: V. F. Vallero—
ST. LOUIS: L. L. Hamig—C. H. Burnap
SHREVEPORT: R. M. Hood—S. W. Beaty
SOUTH TEXAS: E. G. Floeter, Jr.—C. L. Fleming
SOUTHERN CALIFORNIA: A. J. Hess—
SOUTHERN PIEDMONT: R. M. Warren—
SOUTHWEST TEXAS: D. E. Locher—W. E. Long
UTAH: J. L. ASHTON—
VIRGINIA: M. I. Taylor—
WASHINGTON, D. C.: S. R. Allen—G. R. Walz
WESTERN MICHIGAN: H. R. Limbacher—W. C. DeRoo
WESTERN NEW YORK: T. F. Killeen—J. M. Quackenbush
WISCONSIN: B. M. Kluge—F. J. Nunlist, Jr.

Committee on Research: I. W. Cotton, *Chairman;* R. S. Dill, *Vice Chairman;* Cyril Tasker, *Director of Research.*

Three Years: I. W. Cotton, W. A. Grant, N. B. Hutcheon, B. H. Jennings, C. O. Mackey.

Two Years: A. B. Algren, John Everetts, Jr., R. W. Keeton, M.D., T. H. Smoot, W. N. Witheridge.

One Year: Carl F. Boester, R. C. Cross, R. S. Dill, A. J. Hess, H. A. Lockhart.

Executive: I. W. Cotton, *Chairman;* R. S. Dill, *Vice Chairman;* Carl F. Boester, John Everetts, Jr., C. O. Mackey.

Technical Advisory Committees for 1952:

Air Cleaning: A. B. Algren*, *Chairman;* R. C. Cross*, *Vice Chairman;* R. B. Crepps, R. S. Dill*, L. L. Dollinger, Jr., O. C. Eliason, B. G. Evans, R. J. Farr, C. D. Graham, A. J. Hess*, A. B. Hubbard, G. F. Landgraf, K. W. MacKenzie, Arthur Nutting, S. L. Root, Jr., C. B. Rowe, W. T. Van Orman, R. P. Warren, W. B. Watterson.

Air Distribution: G. B. Priester, *Chairman;* W. A. Grant*, *Vice Chairman;* J. M. Black, H. F. Brinen, R. M. Conner, S. H. Downs, S. F. Gilman, Linn Helander, F. B. Holgate, W. O. Huebner, W. W. Kennedy, E. J. Kurek, R. D. Madison, G. E. McElroy, L. G. Miller, H. C. Pierce, C. H. Randolph, T. H. Troller, R. D. Tutt, G. L. Tuve.

Combustion: T. H. Smoot*, *Chairman;* P. R. Achenbach, R. B. Engdahl, H. G. Hays, R. C. Johnson, W. B. Kirk, H. R. Limbacher, A. A. Marks, W. M. Myler, Jr., E. A. Norman, Jr., E. O. Olson, K. O. Schlentner, R. K. Thulman, E. C. Webb, D. L. Wooden.

Cooling Load: W. E. Zieber, *Chairman;* C. O. Mackey*, *Vice Chairman;* K. O. Alexander, John Everetts, Jr.*, W. F. Friend, R. H. Heilman, H. W. Heisterkamp, R. C. Jordan, C. F. Kayan, J. N. Livermore, J. P. Stewart.

Heat Flow Through Glass: R. A. Miller, *Chairman;* N. B. Hutcheon*, *Vice Chairman;* W. J. Arner, F. L. Bishop, E. W. Conover, D. D'Eustachio, W. B. Ewing, J. E. Frazier, J. S. Herbert, R. W. McKinley, E. C. Miles, D. R. Muir, H. B. Vincent, J. R. Young.

Heat Pump: E. P. Palmatier, *Chairman;* C. F. Boester, *Vice Chairman.*

Heating Load: W. S. Harris, *Chairman;* B. H. Jennings*, *Vice Chairman;* A. I. Brown, R. S. Dill*, J. M. Hartman, H. A. Lockhart*, L. G. Miller, V. L. Miller, T. F. Rockwell, S. I. Rottmayer, C. W. Signor.

Heating and Air Conditioning as Related to Plant and Animal Husbandry: A. J. Hess*, *Chairman;* A. B. Algren*, Dr. H. A. Borthwick, Samuel Brody, John Everetts, Jr.*, F. G. Gustafson, S. R. Lewis, H. A. Lockhart*, Dr. H. H. Mitchell, K. V. Thimann, Dr. W. G. Whaley, Dr. R. B. Withrow, H. E. Ziel.

Hot Water and Steam Heating: J. W. James, *Chairman;* H. A. Lockhart*, *Vice Chairman;* R. C. Chewning, H. C. Day, W. S. Harris, L. N. Hunter, A. T. Jones, E. G. Keller, M. W. McRae, N. D. Skinner, S. K. Smith, Benjamin Spieth, M. H. Westerberg.

Human Calorimetry: G. L. Tuve, *Chairman;* I. W. Cotton*, *Vice Chairman;* E. F. DuBois, M.D., Nathaniel Glickman, J. D. Hardy, E. R. Queer, L. E. Seeley, C. P. Yaglou.

Industrial Environment: W. N. Witheridge*, *Chairman;* H. A. Mosher, *Vice Chairman;* J. L. Alden, A. D. Brandt, J. H. Clarke, R. B. Foley, W. C. L. Hemeon, W. O. Huebner, J. M. Kane, M. G. Kershaw, G. E. McElroy, B. F. Postman, K. E. Robinson, Leslie Silverman, B. R. Small, R. P. Warren, H. E. Ziel.

Insulation: M. W. Keyes, *Chairman;* N. B. Hutcheon*, *Vice Chairman;* R. E. Backstrom, L. A. Barron, C. B. Bradley, P. D. Close, R. B. Crepps, R. C. Cross*, E. T. Erickson, F. A. Joy, W. A. Knudson, V. L. Miller, E. R. Queer, R. F. Rea, H. E. Robinson, T. D. Stafford, L. V. Teesdale, R. K. Thulman.

Odors: T. H. Urdahl, *Chairman;* W. N. Witheridge*, *Vice Chairman;* Dr. L. H. Beck, Dr. N. E. Berry, Dr. V. G. Lechner, W. A. Grant*, A. B. Hubbard, G. W. Meek, Dr. Sherman Ross, Dr. R. G. H. Siu, Dr. Amos Turk.

Panel Heating and Cooling: P. B. Gordon, *Chairman;* R. S. Dill*, *Vice Chairman;* A. B. Algren*, John Everetts, Jr.*, L. N. Hunter, J. W. James, J. S. Locke, C. O. Mackey*, S. K. Smith, J. M. van Nieukerken.

Group A — Heat Distribution Within and Behind the Panel: R. S. Dill*, *Chairman;* H. L. Flodin, F. E. Giesecke, G. D. Lain, R. L. Maher, V. L. Miller, D. L. Mills, C. W. Nessell, F. E. Parsons, S. I. Rottmayer, R. T. Schoerner, E. E. Scott, S. K. Smith, R. K. Thulman, S. M. Van Kirk, L. H. Yeager.

Group B — Heat Transfer Between the Panel and the Space: J. M. van Nieukerken, *Chairman;* C. O. Mackey*, *Vice Chairman;* C. M. Ashley, C. F. Boester*, W. P. Chapman, W. S. Harris, Linn Helander, J. W. James, A. T. Jorn, C. F. Kayan, H. A. Lockhart*, W. E. Long, R. L. Maher, R. A. Miller, D. L. Mills, G. L. Wiggs.

Group D — Controls: J. S. Locke, *Chairman;* A. B. Algren*, *Vice Chairman;* H. W. Alyea, Louis Barfus, S. D. Browne, R. L. Campbell, C. A. Gustafson, W. J. Hajek, H. H. Kieckhefer, W. H. Kliever, H. T. Kucera, J. F. McCauley, P. F. Neess, J. K. M. Pryke, A. O. Roche, Jr., C. W. Signor, E. F. Snyder.

Physiological Research: M. K. Fahnestock, *Chairman;* R. W. Keeton*, M.D., *Vice Chairman;* Lester T. Avery, Dr. Thomas Bedford, H. S. Belding, William Bruce, Dr. A. C. Burton, E. F. DuBois, M.D., Col. A. P. Gagge, Nathaniel Glickman, F. K. Hick, M.D., J. W. James, D. H. K. Lee, M.D., R. D. Madison, C. L. Taylor, Capt. T. L. Willmon, Dr. C.-E. A. Winslow.

Sensations of Comfort: C. S. Leopold, *Chairman;* John Everetts, Jr.*, *Vice Chairman;* Lester T. Avery, M. K. Fahnestock, Nathaniel Glickman, A. J. Hess*, A. C. Menke.

Sorption: G. L. Simpson, *Chairman;* John Everetts, Jr.*, *Vice Chairman;* G. C. F. Asker, F. C. Dehler, A. S. Gates, Jr., E. W. Gifford, H. W. Heisterkamp, E. R. McLaughlin.

Sound and Vibration Control: H. A. Lockhart*, *Chairman;* C. M. Ashley, P. H. Geiger, Sidney Gordon, H. C. Hardy, E. M. Herrmann, F. B. Holgate, G. C. Kerr, M. W. Keyes, R. D. Madison, W. L. Rogers, T. H. Troller, T. A. Walters, George Wohlberg.

•

Public Relations: J. R. Vernon, *Chairman;* Clifford Strock, W. D. Graham, Sr., B. L. Evans.

*Member of Committee on Research.

SPECIAL COMMITTEES

ASHVE *Committee on Code for Testing and Rating Heavy Duty Furnaces:* E. K. Campbell, *Chairman;* Bowen Campbell, R. S. Dill, C. J. Low, W. J. MacGirl, B. F. McLouth, F. L. Meyer, L. G. Miller, F. J. Nunlist, Jr., A. A. Olson, H. A. Pietsch, H. A. Soper.

ASHVE *Committee on Safety Regulations for Heating, Ventilating and Air Conditioning Systems:* G. P. Nachman, *Chairman;* F. H. Buzzard, B. F. McLouth, C. H. Randolph, H. W. McKenzie.

International Joint Committee on Psychrometric Data: Dr. B. M. Woods, Berkeley, Calif., *Chairman;* B. A. Dmitrieff, New York, N.Y., *Secretary;* H. H. Bruce, London; G. A. Bull, London; C. S. Cragoe, Washington, D.C.; John A. Goff, Philadelphia; L. P. Harrison, Washington, D. C.; T. J. G. Henry, Toronto; B. H. Jennings, Evanston, Ill.; Dr. F. G. Keyes, Cambridge, Mass.; R. F. Legget, Ottawa; S. G. Rison, Washington, D.C.; P. A. Sheppard, London; J. L. York, Ann Arbor, Mich.

Joint Committee for Revision of Code of Minimum Requirements for Comfort Air Conditioning: W. L. Fleisher, *Chairman;* (ASHVE) O. W. Armspach, A. C. Buensod, C. C. Cheyney; (*ASME*) C. F. Kayan; (*ASRE*)

(*Continued on Next Page*)

JOURNAL SECTION

F. H. Faust, J. A. Schurman; *At large:* M. K. Fahnestock; *(Medical Profession)* E. F. DuBois, M.D., R. W. Keeton, M.D., W. J. McConnell, M.D.

•

Nominating: M. W. Bishop, Chicago, *Chairman;* D. M. Allen, Kansas City, Mo.; *Vice Chairman:* C. B. Gamble, New Orleans, *Secretary.* A. B. Algren, Minneapolis; B. W. Farnes, Portland, Ore.; E. L. Crosby, Baltimore; W. A. Grant, Syracuse; A. J. Hess, Los Angeles; W. G. Hole, Montreal, Que.; B. M. Kluge, Milwaukee; A. J. Offner, Beechhurst, L.I., N.Y. *Alternate:* G. T. Donceel, Oklahoma City.

OFFICERS OF CHAPTERS AND BRANCHES

(49 Chapters—11 Student Branches)

Date indicates year organized; an address and no city shown signifies same city as headquarters; numeral in parentheses indicates zone.

• **ARKANSAS:** 1952. Hdqrs., Little Rock, Ark. Meets, Third Tuesday. PRESIDENT, E. N. Pettit, Jr., 904 Wallace Bldg. SECRETARY, R. E. Blaylock, 509 E. Markham St.

• **ATLANTA:** 1937. Hdqrs., Atlanta, Ga. Meets, Second Monday. PRESIDENT, F. A. Player, 2110 Peachtree Rd., N. W. SECRETARY, J. M. Lazenby, 2641 Merry Lane, N. E., (6).

• **BALTIMORE:** 1949. Hdqrs., Baltimore, Md. Meets, Third Wednesday. PRESIDENT, E. R. Kent, 2322 N. Charles St. (18). SECRETARY, A. M. Kroft, 3935 Stokes Dr. (29).

• **BRITISH COLUMBIA:** 1952. Hdqrs., Vancouver, B.C., Canada. PRESIDENT, M. E. Minaker, 1128 Burrard St. SECRETARY, D. W. Thomson, 445 Richards St.

• **CENTRAL NEW YORK:** 1944. Hdqrs., Syracuse, N. Y. Meets, Fourth Wednesday. PRESIDENT, F. E. Krell, 116 Fernwood Ave. (5). SECRETARY, H. K. Ormsby, 205 S. Townsend St. (2).

• **CENTRAL OHIO:** 1944. Hdqrs., Columbus, Ohio. Meets, Third Monday. PRESIDENT, A. D. Bogen, 330-34 E. Livingston Ave. (15). SECRETARY, J. A. Guy, 219 King Ave. (1).

• **CINCINNATI:** 1932. Hdqrs., Cincinnati, Ohio. Meets, First Tuesday. PRESIDENT, H. E. Russell, 4th & Main Sts., Box 960. SECRETARY, F. W. Wilson, 222-24 E. 14th St.

• **CONNECTICUT:** 1940. Hdqrs., New Haven, Conn. Meets, Third Thursday. PRESIDENT, T. L. Arnold, 26 Francis Ave., Hartford (6). SECRETARY, C. L. L'Hommedieu, 76 Blatchley Ave.

• **DELTA:** 1939. Hdqrs., New Orleans, La. Meets, Third Tuesday. PRESIDENT, Walter Cooke, 816 Howard Ave. (13). SECRETARY, T. J. Jenny, 1000 S. Peters St. (9).

• **EMPIRE STATE CAPITAL:** 1951. Hdqrs., Albany, N. Y. PRESIDENT, Harry Horowitz, 889 Warren St. (3). SECRETARY, R. V. Tougher, Menands Rd., Loudonville, N. Y.

• **GOLDEN GATE:** 1937. Hdqrs., San Francisco, Calif. Meets, First Thursday. PRESIDENT, T. J. White, 625 Market St. (5). SECRETARY, Eric Roberts, 417 Market St. (5).

• **ILLINOIS:** 1906. Hdqrs., Chicago, Ill. Meets, Second Monday. PRESIDENT, M. W. Bishop, Rm. 1504, 228 N. LaSalle St. (1). SECRETARY, G. V. Zintel, 1217 W. Washington Blvd. (7).

• **INDIANA:** 1943. Hdqrs., Indianapolis, Ind. Meets, Fourth Tuesday. PRESIDENT, J. T. Hardin, 720 Noble St. (2). SECRETARY, P. O. Patterson, 6300 N. Oakland Ave. (18).

• **INLAND EMPIRE:** 1950. Hdqrs., Spokane, Wash. Meets, First Friday after First Tuesday. PRESIDENT, T. P. Nau, S.-1419 Walnut (9). SECRETARY, H. A. Bickel, E. 7 Riverside Ave.

• **IOWA:** 1940. Hdqrs., Des Moines, Ia. Meets, Second Tuesday. PRESIDENT, R. H. Schnell, 1617 33rd St. (11). SECRETARY, Bowen Campbell, 1435 Casady Dr. (5).

• **KANSAS:** 1951. Hdqrs., Wichita, Kan. PRESIDENT, O. P. Bullock, 254 Laura (7). SECRETARY, H. D. Speyer, 120 Ida.

• **KANSAS CITY:** 1917. Hdqrs., Kansas City, Mo. Meets, First Monday. PRESIDENT, W. A. Reichow, 1621 E. 31st St. (3). SECRETARY, J. G. Barnes, Jr., 1924 Oak St.

• **MANITOBA:** 1935. Hdqrs., Winnipeg, Man., Canada. Meets, Third Thursday. PRESIDENT, W. J. Atkinson, 812 Boyd Bldg. SECRETARY, Ernest Lambert, 93 Lombard St.

• **MASSACHUSETTS:** 1912. Hdqrs., Boston, Mass. Meets, Third Tuesday. PRESIDENT, G. B. Torrens, 15 Alden Lane, Shrewsbury. SECRETARY, G. D. Fife, Rm. 606, 79 Milk St. (9).

• **MEMPHIS:** 1944. Hdqrs., Memphis, Tenn. Meets, Third Monday. PRESIDENT, W. L. Drake, 15 N. Reese. SECRETARY, A. T. Bevil, 212 Robinson Bldg., 160 Union (3).

• **MIAMI VALLEY:** 1950. Hdqrs., Dayton, Ohio. Meets, First Wednesday. PRESIDENT, D. L. Bergman, Box 95, Riverdale Sta. (5). SECRETARY, D. E. Tullis, 1720 Park Pl. (6).

• **MICHIGAN:** 1916. Hdqrs., Detroit, Mich. Meets, First Monday after 10th of month. PRESIDENT, C. A. Strand, 9117 Hamilton Ave. (2). SECRETARY, D. S. Falk, 4864 Woodward Ave. (1)

• **MINNESOTA:** 1918. Hdqrs., Minneapolis, Minn. Meets, First Monday. PRESIDENT, William Sturm, 2160 Highland Pkwy., St. Paul (5). SECRETARY, J. G. Hamm, 850 Cromwell Ave., St. Paul (4).

• **MONTREAL:** 1936. Hdqrs., Montreal, Que., Canada. Meets, Third Monday. PRESIDENT, W. G. Hole, 140 Prince St. SECRETARY, D. L. Lindsay, 1411 Crescent St. (25).

• **NEBRASKA:** 1940. Hdqrs., Omaha, Neb. Meets, Second Tuesday. PRESIDENT, S. W. Black, 18th & Harney Sts. SECRETARY, H. H. Ulrich, 507 City Hall (2).

• **NEW YORK:** 1911. Hdqrs., New York, N. Y. Meets, Third Monday. PRESIDENT, P. B. Gordon, 222 E. 41st St. (17). SECRETARY, Carl B. Flink, 62 Worth St. (13).

• **NORTH TEXAS:** 1938. Hdqrs., Dallas, Tex. Meets, Third Monday. PRESIDENT, R. E. Allison, 607-11 First Ave. (10). SECRETARY, M. W. Brown, 1213 Texas Bank Bldg. (2).

• **NORTHEASTERN OKLAHOMA:** 1948. Hdqrs., Tulsa, Okla. PRESIDENT, C. H. Dollmeyer, Jr., 1533 N. New Haven Ave. (15). SECRETARY, V. W. Miles, 624 So. Boston Ave., Box 871.

• **NORTHERN OHIO:** 1916. Hdqrs., Cleveland, Ohio. Meets, Second Monday. PRESIDENT, R. E. Sherman, 570 Hanna Bldg. (15). SECRETARY, R. G. Huebscher, 7218 Euclid Ave. (3).

• **NORTHERN PIEDMONT:** 1952. Hdqrs. Greensboro, N.C. PRESIDENT, L. L. Vaughan, P.O. Box 5746, Raleigh. SECRETARY, J. W. Bunn, Jr., 2705 Lochmore Dr., Raleigh.

• **OKLAHOMA:** 1935. Hdqrs., Oklahoma City, Okla. Meets, Second Monday. PRESIDENT, W. J. Collins, Jr., 1708 Westminster Pl. SECRETARY, F. X. Loeffler, Jr., 1604 N. W. Fifth St.

• **ONTARIO:** 1922. Hdqrs., Toronto, Ont., Canada. Meets, First Monday. PRESIDENT, J. H. Ross, 1251 Yonge St. SECRETARY, H. R. Roth, 57 Bloor St., W.

• **OREGON:** 1939. Hdqrs., Portland, Ore. Meets, Thursday after First Tuesday. PRESIDENT, K. H. Hanson, 104 S.E. Seventh (14). SECRETARY, W. R. Norte, P.O. Box 3918.

• **PACIFIC NORTHWEST:** 1928. Hdqrs., Seattle, Wash. Meets, Second Tuesday. PRESIDENT, W. B. Pride, 3111 Dose Ter. (44). SECRETARY, I. L. Winsor, 105 Orcas St. (8).

• **PHILADELPHIA:** 1916. Hdqrs., Philadelphia, Pa. Meets, Second Thursday. PRESIDENT, M. E. Barnard, 12 S. 12th St. (7). SECRETARY, C. J. Lubking, 5060 Wayne Ave.

• **PITTSBURGH:** 1919. Hdqrs., Pittsburgh, Pa. Meets, Third Monday. PRESIDENT, B. B. Reilly, Fifth & Liberty Aves. (22). SECRETARY, E. H. Riesmeyer, Jr., 231-33 Water St. (22).

• **ROCKY MOUNTAIN:** 1944. Hdqrs., Denver, Colo. Meets, First Wednesday. PRESIDENT, N. H. Brickham, 2715 S. Humboldt St. (10). SECRETARY, A. S. Widdowfield, 1925 Blake St. (2).

• **ST. LOUIS:** 1918. Hdqrs., St. Louis, Mo. Meets, Second Tuesday. PRESIDENT, L. L. Hamig, 1706 Olive St. (3). SECRETARY, J. F. Naylor, Jr., 2335 S. Grand Ave. (4).

• **SHREVEPORT:** 1948. Hdqrs., Shreveport, La. Meets, Third Thursday. PRESIDENT, R. M. Hood, 411 Louisiana Ave. SECRETARY, M. A. Hudson, 4609 Gilbert Dr.

• **SOUTH TEXAS:** 1938. Hdqrs., Houston, Tex. Meets, Third Friday. PRESIDENT, C. L. Fleming, 809 M. & M. Bldg. SECRETARY, J. W. Holland, Esperson Bldg. (2).

• **SOUTHERN CALIFORNIA:** 1930. Hdqrs., Los Angeles, Calif. Meets, First Tuesday. PRESIDENT, J. S. Earhart, 2734 Fleur Dr., San Marino (9). SECRETARY, C. D. Walz, 3600 San Pasqual St., Pasadena (10).

• **SOUTHERN PIEDMONT:** 1952. Hdqrs. Charlotte, N.C. PRESIDENT, R. M. Warren, Jr., P.O. Box 1755, Charlotte. SECRETARY, J. A. Rice, P.O. Box 1755, Charlotte.

• **SOUTHWEST TEXAS:** 1946. Hdqrs., San Antonio, Tex. Meets, Third Tuesday. PRESIDENT, W. E. Long, Dept. of Mechanical Engrg., University of Texas, Austin. SECRETARY, L. H. Hornor, Jr., 810 Insurance Bldg.

• **UTAH:** 1944. Hdqrs., Salt Lake City, Utah. Meets, First Wednesday. PRESIDENT, D. R. Wilde, 2634 S. 19th E. (1). SECRETARY, Alfred Richeda, P.O. Box 479 (9).

• **VIRGINIA:** 1946. Hdqrs., Norfolk, Va. Meets, Third Wednesday. PRESIDENT, D. E. Phillips, P. O. Box 674, Newport News. SECRETARY, H. E. Marquart, 111 W. Main St. (10).

• **WASHINGTON, D. C.:** 1935. Hdqrs., Washington, D. C. Meets, Second Wednesday. PRESIDENT, S. R. Allen, 942 Washington Bldg. (5). SECRETARY, P. H. Loughran, Jr., 4513 49th St., N.W. (16).

• **WESTERN MICHIGAN:** 1931. Hdqrs., Grand Rapids, Mich. Meets, Second Monday. PRESIDENT, H. R. Limbacher, 760 E. Vine St., Kalamazoo. SECRETARY, F. K. Platt, P.O. Box 307, Kalamazoo.

• **WESTERN NEW YORK:** 1919. Hdqrs., Buffalo, N. Y. Meets, Second Monday. PRESIDENT, J. M. Quackenbush, 505 Franklin St. (2). SECRETARY, Q. P. Thompson, 260 Richmond Ave. (22).

• **WISCONSIN:** 1922. Hdqrs., Milwaukee, Wis. Meets, Third Monday. PRESIDENT, J. A. Ioffe, 2505 N. 97th St., Wauwatosa (10). SECRETARY, I. J. Rossiter, 231 W. Wisconsin (3).

STUDENT BRANCHES

• **COLLEGE OF CITY OF NEW YORK:** 1949. Hdqrs., New York, N. Y.

• **LOUISIANA POLYTECHNIC INSTITUTE:** 1949. Hdqrs., Ruston, La. PRESIDENT, W. G. McMullen, Box 472, Tech Station. SECRETARY, R. L. Gorton, Box 184, Tech Station.

• **NORTH CAROLINA STATE COLLEGE:** 1948. Hdqrs., Raleigh, N. C. PRESIDENT, Sydney Narvey, 5-B Vetville, State College Station. SECRETARY, E. A. Travis, Jr., P.O. Box 3333, Bagwell Dormitory.

• **OKLAHOMA A. & M. COLLEGE:** 1950. Hdqrs., Stillwater, Okla. PRESIDENT, Stuart Cohen, 513 ½ Knoblock. SECRETARY, H. G. Rice, 5 Chickasha, Box 417, Vets Village.

• **OREGON STATE COLLEGE:** 1949. Hdqrs., Corvallis, Ore. Meets, First Wednesday after First Tuesday. PRESIDENT, D. W. Blair, 223 W. 15th St. SECRETARY, C. D. Cannon, 404 N. 26th St.

• **PURDUE UNIVERSITY:** 1948. Hdqrs., W. Lafayette, Ind. CHAIRMAN, N. J. Kirch, 922 Highland Ave., Lafayette. SECRETARY, H. F. Allen, Jr., 629 University St.

• **TEXAS A. & M. COLLEGE:** 1946. Hdqrs., College Station. Meets, Second and Fourth Tuesday. PRESIDENT, J. O. Kadel, Box 4054. SECRETARY, W. C. Haggard, Box 5227.

• **UNIVERSITY OF DETROIT:** 1949. Hdqrs., Detroit, Mich. Meets, First Tuesday. PRESIDENT, G. H. Williams, 18251 Washburn (21). SECRETARY, R. H. Drake, 5598 Hurlbut (13).

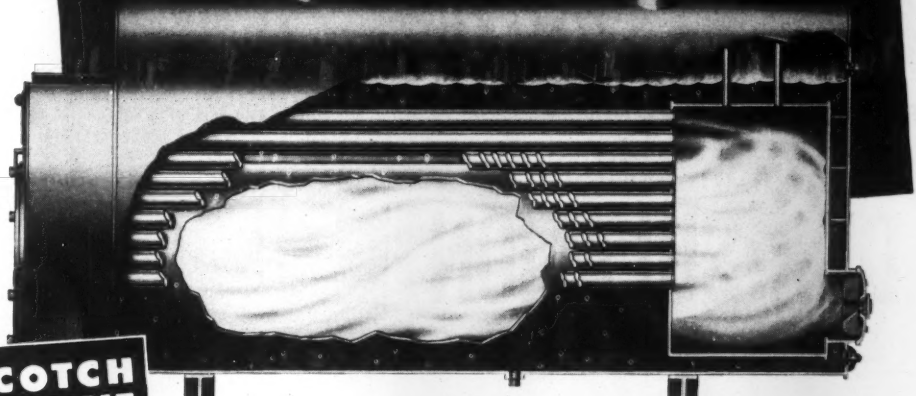
• **UNIVERSITY OF KANSAS:** 1949. Hdqrs., Lawrence, Kans. Address mail to Dr. Warren E. Snyder, chairman, Dept. of Mechanical Engineering, University of Kansas.

• **UNIVERSITY OF TEXAS:** 1949. Hdqrs., Austin, Tex. Meets, First and Third Tuesday. PRESIDENT, W. A. Cox, 360-D Deep Eddy Apts. SECRETARY, V. H. Miles, PHP Dorm J.

• **UNIVERSITY OF TORONTO:** 1951. Hdqrs., Toronto, Ont. CHAIRMAN, J. A. Slemin, 21 Wilberton Rd. SECRETARY, T. O. Smith, 455 Avenue Rd.

Completely Water Jacketed...

FOR BIG SAVINGS IN FUEL AND INSTALLATION



SCOTCH MARINE

Low Pressure Heating Boiler

The rear furnace wall and all other heating surfaces are water jacketed in this popular Fitzgibbons steel boiler. As a result, there is greater heat transfer, flue gas temperatures are lower, fuel consumption is reduced and the usual rear dry wall refractory lining is eliminated. The low water line and corresponding low head-room further simplify installation where conditions require this type of boiler. Catalog HP-9 gives complete details. Write for it today.

MOST ECONOMICAL IN FUEL — 1886 — THE FITZGIBBONS BOILER

SINCE 1886

Fitzgibbons Boiler Company, Inc.

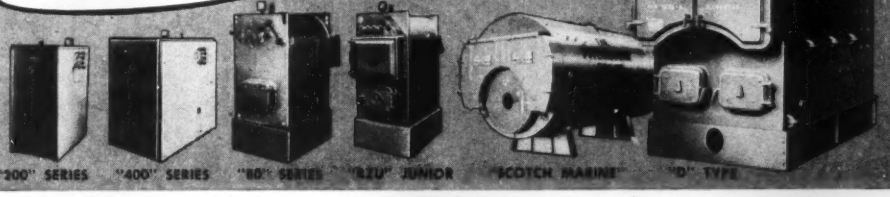
General Offices: 101 PARK AVENUE, NEW YORK 17, N. Y.

Manufactured at OSWEGO, N. Y. • Branches in Principal Cities

SBI

A steel boiler is a lifetime investment —sell "the best in steel boiler heat"—

THE FITZGIBBONS BOILER®



"...costs more, AND WORTH IT!"

Grant Wilson

DUX-SULATION

(ASBESTOS-PROTECTED)

The initial cost of DUX-SULATION may be higher — but by the time a good job is completed you have the BEST Thermal/Acoustical Duct Insulation possible. It's worth more because:

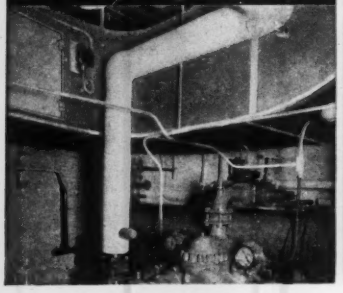
1. **Comes complete with adhesive and tape — there are no extras to buy.**
2. **It permanently maintains its original specified thickness — even at the corners and joints.**
3. **Its application is fast, simple and secure. It is ideal for application on (inside or outside) round, rectangular or irregular shaped duct-work.**
4. **DUX-SULATION will not mat down, sift, crumble, powder or shift. It can be installed in the shop or on the job because it's stronger and tougher. It's non-irritating.**

You will want to see and feel the superior construction of Asbestos-Protected DUX-SULATION. So write for a free sample today. Then you will know why it's worth more and why you can specify it with confidence.

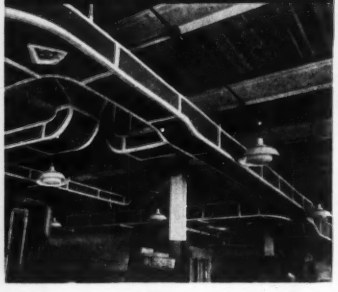
Write to: ***GRANT WILSON INCORPORATED***
BOARD OF TRADE — SUITE 1506B
CHICAGO 4, ILLINOIS

see our CATALOG in SWEET'S FILE

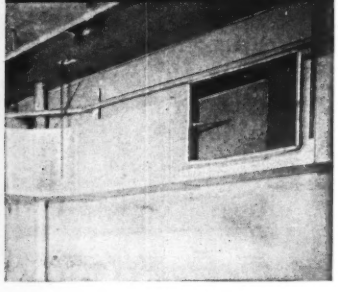
Insulates Against Cold

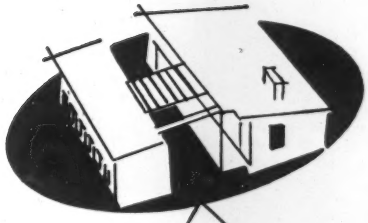


Insulates Against Heat

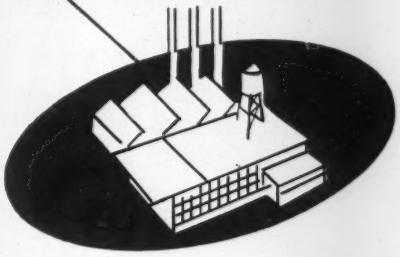


Insulates Against Sound





from HATCHERIES to FACTORIES . . .



Jackson & Church supplies agriculture and industry with dependable warm air heat

Jackson & Church dealers are meeting the demands of today's approved industrial building program with forced warm air heating and ventilating systems that save money, space, installation time and critical materials.

J-C PoweRated*, Poweraire and Suspension Units are available in a range of sizes from 112,000 to 3,800,000 Btu output. Our Engineering Department is at your service to assist with heating plans and problems.

See your local dealer or write today for details.

**PoweRated . . . designed to meet specific Btu requirements*

. . . America's Largest and Most Complete Warm Air Heating Line . . .

J-C

JACKSON & CHURCH COMPANY, SAGINAW, MICHIGAN

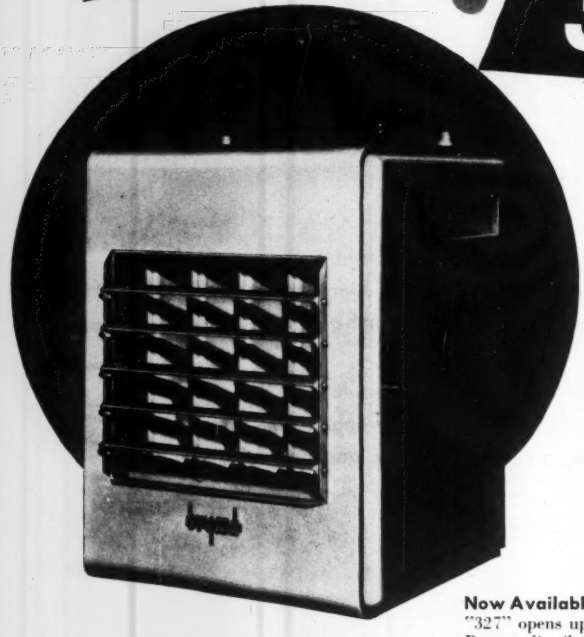
WORK WELL DONE SINCE '81

IT'S NEW

IT'S BETTER

IT'S bryant's SENSATIONAL

"327" UNIT HEATER



Sets NEW standards in . . .

Quiet Operation . . . NO narrow passages to cause whistling . . . it's open, streamlined—efficiently designed to HUSH the air flowing through.

Compactness . . . the "327" installs within inches of ceiling, saving space. It's lighter, easier to handle, easier to install.

Comfort . . . no cold blasts at start of cycle. Fan won't start until the heat exchanger is warm enough to assure comforting heat.

Long, Trouble-free Performance . . . the "327" retains its high efficiency for life. Efficient Venturi tubes provide longer, trouble-free service, less heat loss up the flue.

Extra-Sensitive Controls . . . responsive low-voltage controls mean better, more uniform heat. Safety controls prevent overheating.

Quick, Easy Servicing . . . easy-open access panel at bottom permits cleaning and servicing without removing unit.

Now Available in All Popular Sizes—Yes, the revolutionary Bryant "327" opens up hundreds of new unit heater sales for you. See your Bryant distributor today or write Bryant Heater Division, Affiliated Gas Equipment, Inc., Dept. 126, 17825 St. Clair Ave., Cleveland, Ohio.

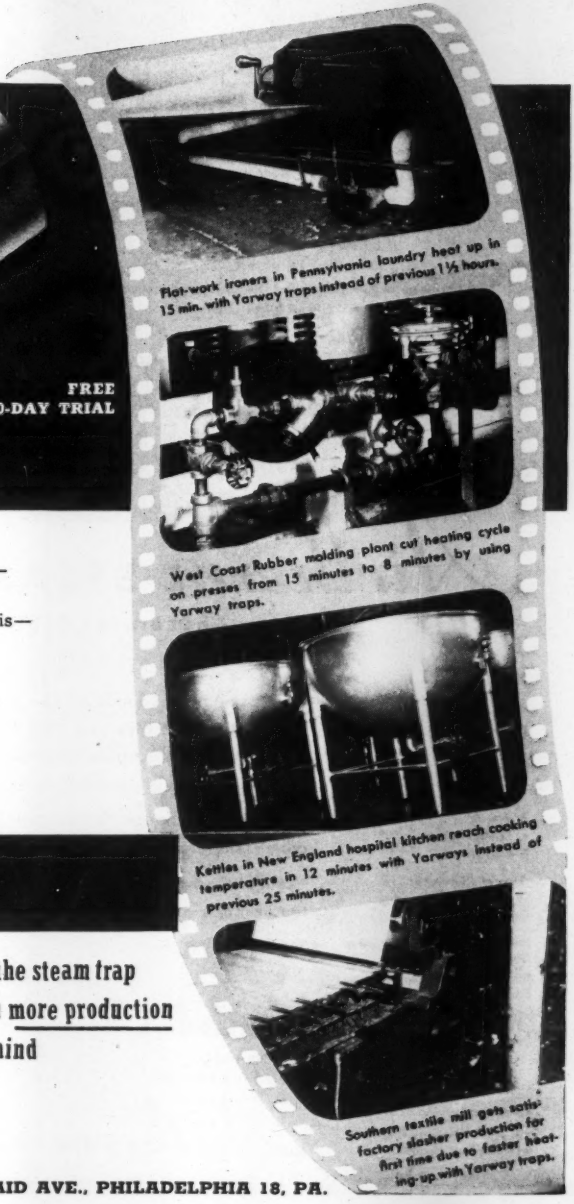
FREE
for the Asking!

Call your Bryant distributor for your copy of this 20-page, fully illustrated book which provides helpful information on specifying, installing and properly locating unit heaters.

bryant® *best buy in*

HEATING AIR CONDITIONING • WATER HEATING

steam trap trial shows how to increase production



Flat-work ironers in Pennsylvania laundry heat up in 15 min. with Yarway traps instead of previous 1½ hours.

West Coast Rubber molding plant cut heating cycle on presses from 15 minutes to 8 minutes by using Yarway traps.

Kettles in New England hospital kitchen reach cooking temperature in 12 minutes with Yarways instead of previous 25 minutes.

Southern textile mill gets satisfactory slasher production for first time due to faster heating-up with Yarway traps.

These 4 plants—each in a different industry—have something in common. Each installed a Yarway Impulse Steam Trap on a trial basis—and after witnessing the production-boosting results, they standardized on Yarway traps.

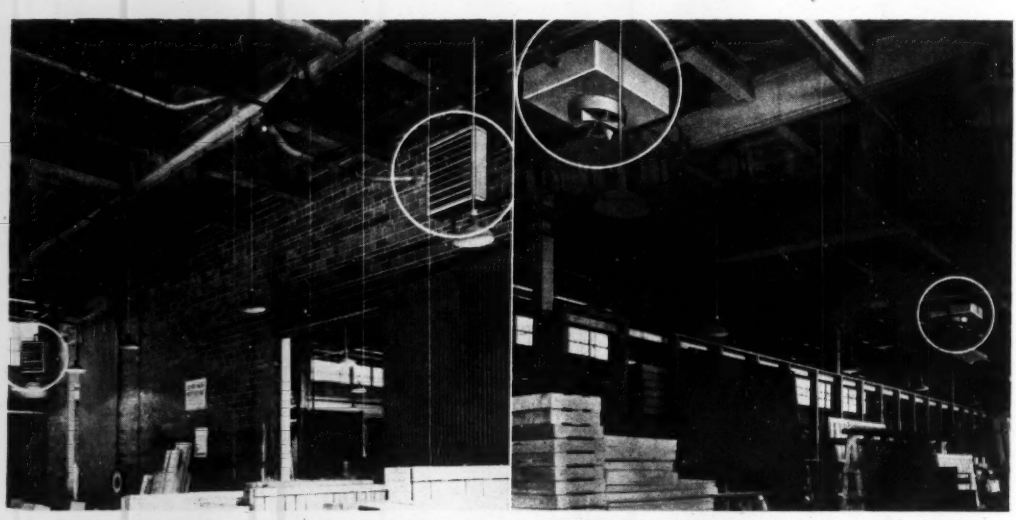
Experiences like these are found in hundreds of plants because Yarways are *designed* to get equipment *hot in a hurry,* and therefore into production fast.

Coupled with other Yarway Impulse Steam Trap advantages like small size, easy installation, stainless steel construction, easy maintenance and low cost—it explains why more than 800,000 Yarways have already been installed.

[redacted]

the steam trap designed with more production in mind

YARNALL-WARING COMPANY • 107 MERMAID AVE., PHILADELPHIA 18, PA.



AIRTHERM Horizontal Discharge Unit Heaters installed on the loading platform of Pittsburgh Plate Glass Company.

AIRTHERM Vertical Discharge Unit Heaters installed in the Pittsburgh Plate Glass Company warehouse.

For "TAILOR MADE" Temperature In Every Department...

Airtherm STEAM UNIT HEATERS

Were Chosen for PITTSBURGH PLATE GLASS CO.
ST. LOUIS, MISSOURI

Here's another example of how the complete line of AIRTHERM Steam Unit Heaters can give you truly *flexible heating* to meet the many different requirements in factories, warehouses, garages, super markets, schools, offices, bowling alleys and similar buildings.

Horizontal Discharge Heaters are built in eleven standard and eleven low outlet temperature models, in capacities from 18,600 BTU to 270,000 BTU.

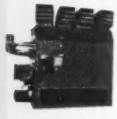
Vertical Discharge Heaters are built in seven standard and seven low outlet temperature models, in capacities from 32,300 BTU to 350,000 BTU.

Architect:
A. Stanley Knorth & Associates

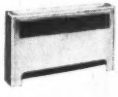
General Contractor:
Woermann Construction Company

Heating and Air Conditioning Contractor:
Sodemann Heat and Power Company

Consulting Engineers:
Ferris & Hamig



Oil or Gas Direct Fired Heaters



Convectors

Centrifugal Fan Type Unit Heaters

Write for Catalog 1209.
Ask your Wholesaler for Airtherm Unit Heaters.

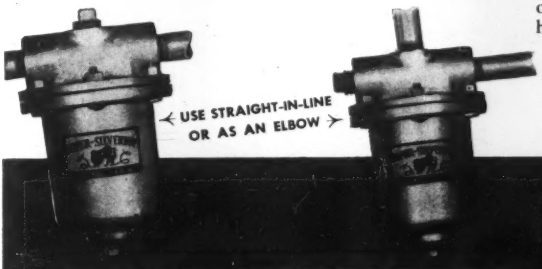
Airtherm MANUFACTURING COMPANY
711 SOUTH SPRING AVENUE • ST. LOUIS 10, MISSOURI

Check Your Unit Heater Steam Traps Now

Be prepared for winter. Equip every unit heater *now* with a Super-Silvertop Steam Trap. These traps quickly remove the cold, dead air from the core of unit heaters and permit them to fill up in much less time with hot, dry steam. Then by draining all water and condensate out of the coils, Super Silvertops enable heaters to produce maximum heat. Besides, they guard unit heaters against corrosion from moisture. Super Silvertops save enough fuel to more than pay for themselves by winter's end!

Super Silvertops, installed straight in line or as an elbow, give you more efficient steam trapping at less cost and can be serviced without disturbing a single pipe fitting . . . and the patented guided bucket eliminates bucket damage common with other traps. The booklet "Solving Steam Trap Problems" contains complete data on selecting proper size steam traps for unit heaters. Write for your copy today.

THE V. D. ANDERSON COMPANY
1949 West 96th Street Cleveland 2, Ohio



SUPER-SILVERTOPS SAVE MONEY

THE V. D. ANDERSON COMPANY
1949 West 96th Street • Cleveland 2, Ohio

Gentlemen: Please send without obligation "Solving Steam Trap Problems."

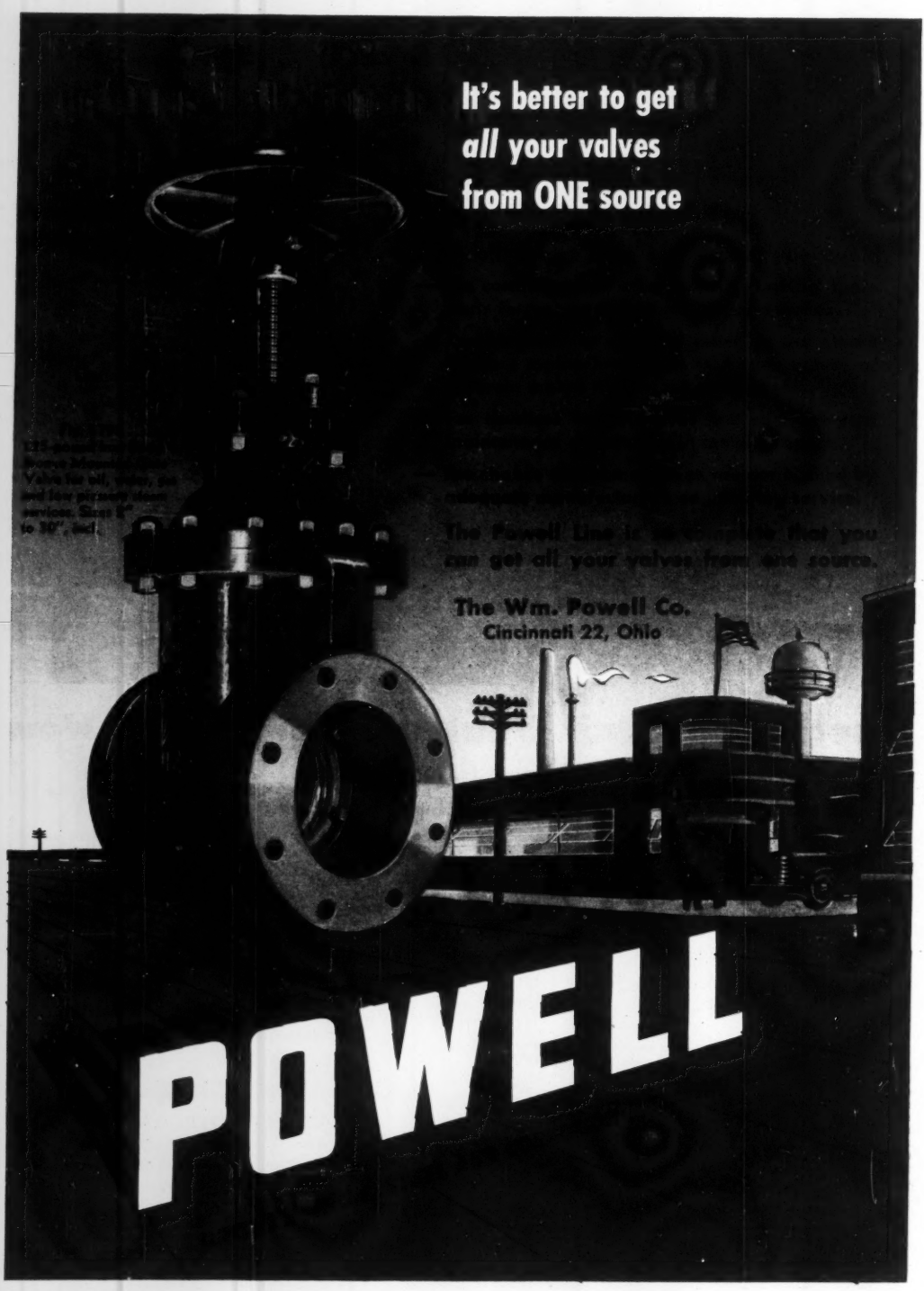
Name_____

Company_____

Address_____

City_____ Zone___ State_____

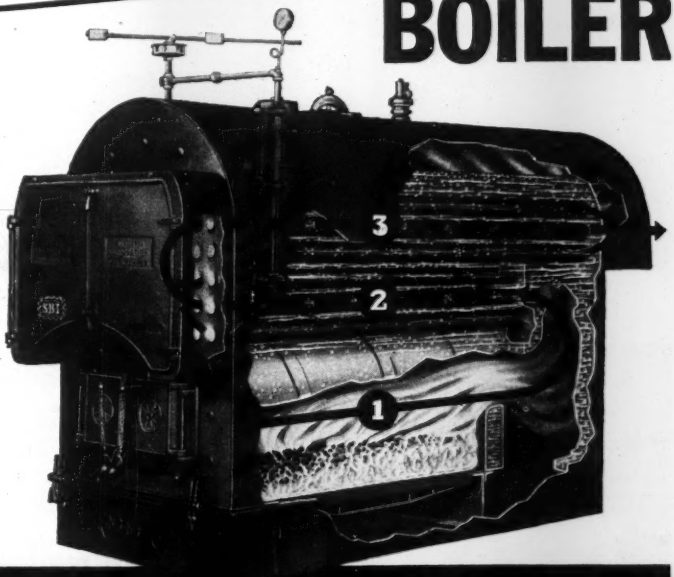
In Canada: Bawden Industries, Ltd., Toronto


It's better to get
all your valves
from ONE source
The Wm. Powell Co.
Cincinnati 22, Ohio
POWELL

This is the Compact Type STEEL BOILER

with the famous

BURNHAM FIRE TRAVEL*



***3 times-back-and-forth fire travel means heat transfer is more efficient — you get more BTUs per unit of fuel!**

THE BURNHAM "COMPACT TYPE" Welded Steel Boiler with this famous feature is notable for low flue temperatures, high boiler efficiency and low fuel costs. Capacities for SBI Steam Hand-fired range from 3,000 to 35,000 sq. ft. and SBI Steam Automatic from 3,650 to 42,500 sq. ft.; SBI Hot Water Hand-fired range from 4,800 to 56,000 sq. ft. and SBI Hot Water Automatic from 5,840 to 68,000 sq. ft.

Long experience and intensive research have produced in this efficient BURNHAM Steel Boiler the last word in quality and dependability.

Some of its outstanding features are: Large steam dome permitting quick, easy steaming without priming. Rapid, continuous water circulation for efficient heat transfer. All sediment settles away from hot surfaces. Low water line for easy installation and piping. Plenty of clean-out plugs.

For schools, apartments, greenhouses and similar installations the BURNHAM "COMPACT" Steel Boiler provides dependable low cost heat. Send for 8 page catalog with full details and ratings.

Copper coils, storage or tankless type, can be installed in all sizes for an abundant supply of domestic hot water.

Burnham Corporation

"PIONEERS OF RADIANT BASEBOARD HEATING"

IRVINGTON, N. Y., Dept. HP-92

STEEL BOILER INSTITUTE SBI HEATING · PROCESS · POWER

Burnham RADIANT HEATING SINCE 1873

BURNHAM CORPORATION
Irvington, New York Dept. HP-92

Please send copy of catalog SB-104 giving details and ratings on Burnham Steel Boilers.

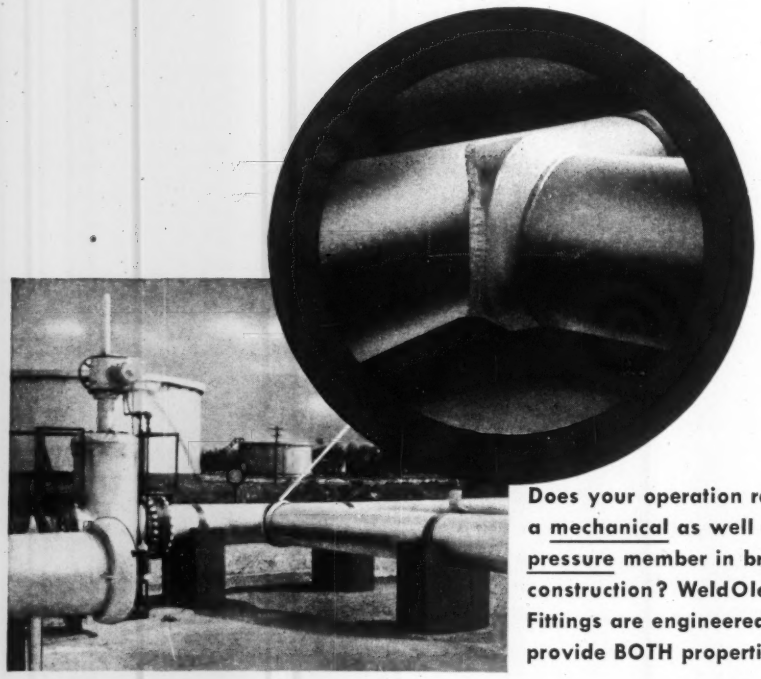
Name _____

Address _____

City _____ State _____

ENGINEERED REINFORCEMENT

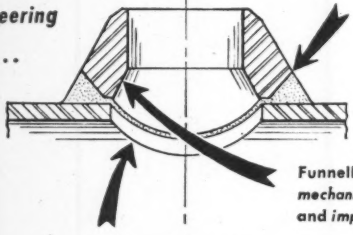
FOR YOUR BRANCH CONNECTIONS



Does your operation require a mechanical as well as a pressure member in branch construction? WeldOlet Welding Fittings are engineered to provide BOTH properties.

A big portion of your engineering job is done for you, if you...

Specify Bonney WeldOlet Welding Fittings to Insure Permanent Strength



Reinforcement where both the mechanical and internal *stresses are most severe*

Funnelled to relieve *mechanical stress concentrations* and *improve fluid flow*

Shaped and beveled for *clean, quick and economical installation*

FOR COMPLETE ENGINEERING DATA WRITE FOR YOUR BONNEY W3 WELDOLET CATALOG

WELDING FITTINGS DIVISION

BONNEY FORGE & TOOL WORKS

ENG. DEPT., 715 MEADOW STREET

ALLENTOWN, PENNSYLVANIA

NOW! *Pur Air* Gives WRITTEN CERTIFICATION of Carbon Quality

The only positive way to eliminate odor and gas problems is with activated carbon of guaranteed adsorptive qualities. That is why we certify carbon quality. Written certification is based on individual batch tests that guarantee the carbon in your equipment to be full 50-minute, Activated, Coconut-Shell Carbon, based on the grueling, accelerated chlorpicrin test. 15,000 tests prove this to be most effective. Pur Air, being the only manufacturer that both produces Pur Air ACSC* and builds equipment, too, can guarantee results.

Pur Air ACSC* equipment is available for installation in duct systems and in self-contained units for taverns, restaurants, offices, storages, etc. Nice thing about all of this is the pay-off economy. You can re-use the same air (without costly cooling or heating). Intake of "off temperature" outside air is reduced. Savings often pay for equipment in a couple of years.

If you have an odor or gas removal problem, call on us for recommendations. There are 77 offices at your service.

*ACSC — full 50-minute, activated, coconut-shell carbon

Pur Air

— a division of
American Solvent Recovery Corp.
Eighth and Cassady Avenues
Columbus 3, Ohio

Pur Air — a division of American Solvent Recovery Corp.
Dept. HP Eighth and Cassady Avenues Columbus 3, Ohio

Please send further information about Pur Air equipment

Name_____

Company_____

Address_____

City_____ State_____

3,500,000

ROSES MUST NOT GET COLD

E. G. HILL CO., INC., RICHMOND, INDIANA

Three and one-half million roses, forty thousand orchids and nearly a million gardenias are grown each year in this huge greenhouse.

Investment in plants and labor is tremendous—losses from even brief chilling would be disastrous.

Detroit RotoStokers Guard Against Loss

Detroit RotoStokers are good protection. These dependable spreader stokers keep up steam without fail.

Available with power, hand-dumping or stationary grates —will burn any type Bituminous coal or Lignite—high efficiency. They have a record for long life, with low maintenance.

Write for bulletin on Detroit RotoStokers. No obligation.

DETROIT SINCE 1898 STOKERS

DETROIT STOKER COMPANY

General Motors Building—Detroit 2, Michigan

District Offices in Principal Cities • Works at Monroe, Michigan

White-Rodgers INDOOR-OUTDOOR Control

FITS HEATING to the WEATHER

By sensing outdoor temperature changes, the White-Rodgers Indoor-Outdoor Control **with adjustable ratio** anticipates the home owner's comfort needs and prevents the heating system from producing uncomfortable temperature "over-runs" thus providing greater owner satisfaction.

Easily installed on new or old systems by any qualified heating contractor. Only two simple adjustments required —user can easily make additional adjustments if needed.

Types for Warm Air and Hot Water (radiant panel or conventional systems).

Write today for detailed literature

WHITE-RODGERS

Controls FOR REFRIGERATION HEATING AND AIR CONDITIONING

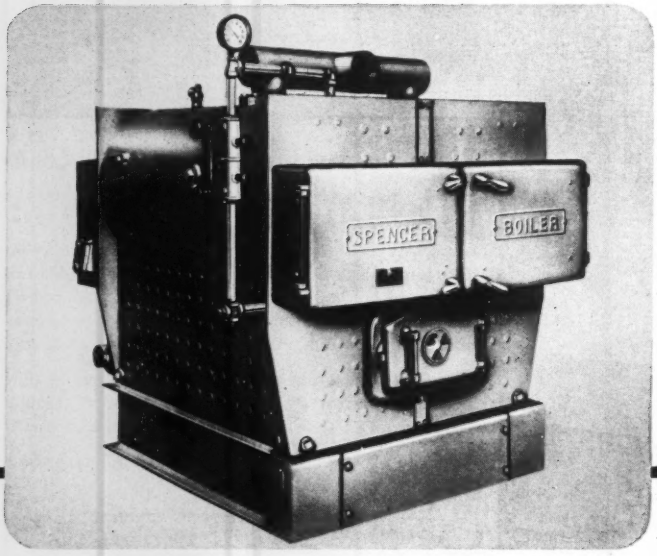
NOW! A real advance in Boiler Design!

SPENCER'S

NEW DIVIDED LOW-WATERLINE BOILER!

We flattened it out to beat the headroom problem! Overall height is approximately 25% less than conventional firebox boilers.

We divided it in half to help you get it through narrow basement openings. The two watertight sections can be moved in separately, yet require no welding for installation and assembly.



The new Spencer Divided Low-Waterline Boiler is available in a range of sizes from 3,500 to 42,500 square feet, steam. Working pressures are 15 pounds steam and 30 pounds water. Also available for working water pressures up to 100 pounds.

Fast-steaming through the use of staggered rows of fire tubes. **Self-cleaning**—since water sides of heating surfaces are kept free of sediment. **Instantaneous or tank-type** service water-heating coils in a wide range of capacities. **Quickly convertible** from mechanical to hand-firing, whenever desired. **High firebox** for quiet and complete burning of fuels.

Only one of Spencer's complete line of boilers

THERE'S A SPENCER FOR EVERY BUILDING...FOR EVERY FUEL

Designed, constructed and stamped in accordance with requirements of the ASME Boiler Construction Code.

Rated in accordance with SBI Code.

Inspected and approved by licensed National Board Insurance Inspector.

SPENCER HEATER
LYCOMING-SPENCER DIVISION
WILLIAMSPORT PENNSYLVANIA

where power is part of the product,

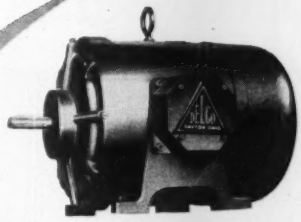
you're right with a

DELCO

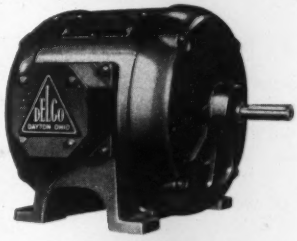
When you need motors—to serve as a *part* of your product or to help you *make* your product—look to Delco for the motors that will serve you best.

Delco produces motors for practically every known purpose . . . and each Delco motor is *engineered* for the kind of work it has to do. It's made of the finest materials, and constructed to stand up longer under the roughest conditions.

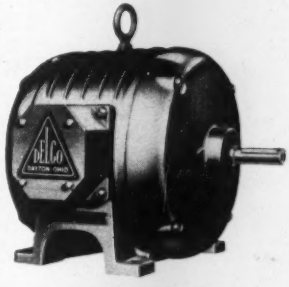
So check on Delco. You'll find Delco motors fit your needs, and that Delco always delivers on time. For complete details, write to Delco Products, Dayton, Ohio, or call the nearest sales office listed below.



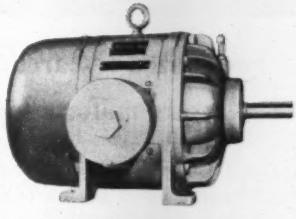
TOTALLY ENCLOSED FAN-COOLED MOTOR



OPEN BALL-BEARING MOTOR



TOTALLY ENCLOSED MOTOR



EXPLOSION-PROOF MOTOR

DELCO PRODUCTS

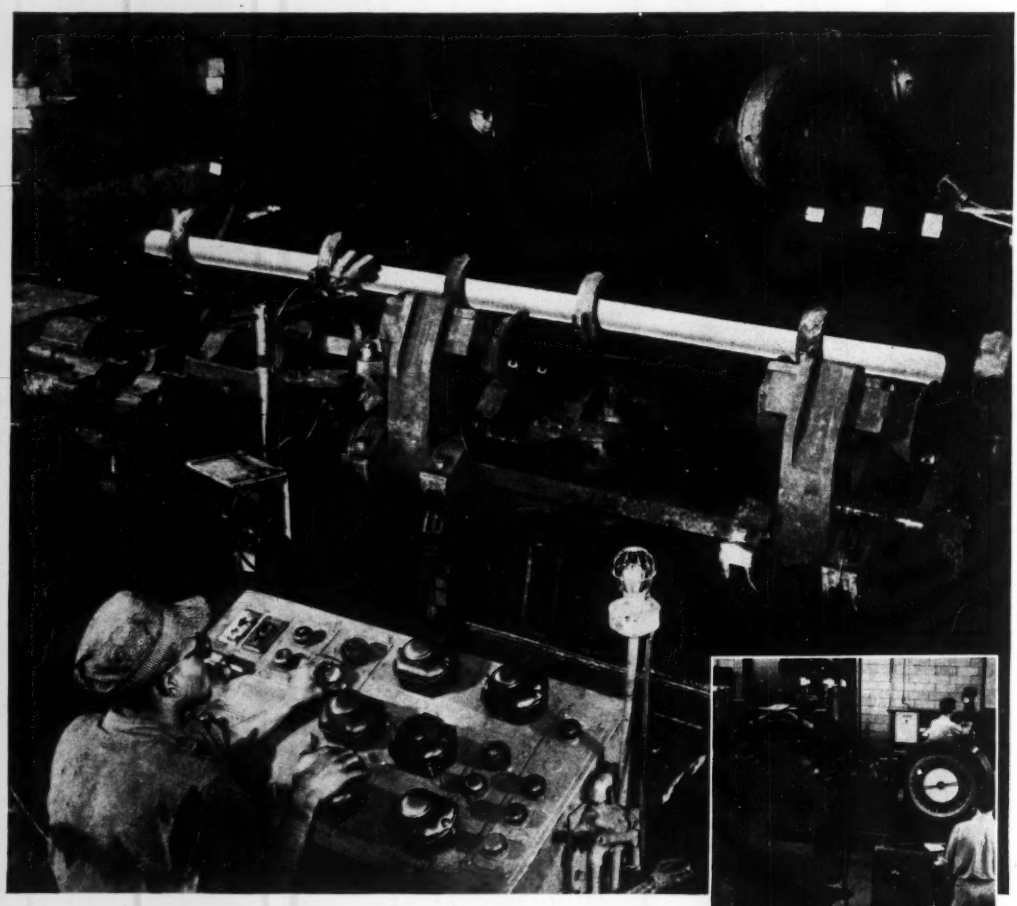
Division of General Motors Corporation
Dayton, Ohio

DELCO DAYTON OHIO

SALES OFFICES:
ATLANTA • CHICAGO • CINCINNATI • CLEVELAND
DALLAS • DETROIT • HARTFORD • PHILADELPHIA
ST. LOUIS • SAN FRANCISCO

DELCO FEATURES MAKE DELCO FINEST

Specify GLOBE for the finest steel tubes



Specialized research, engineering and production assure uniform high-quality STEEL TUBES

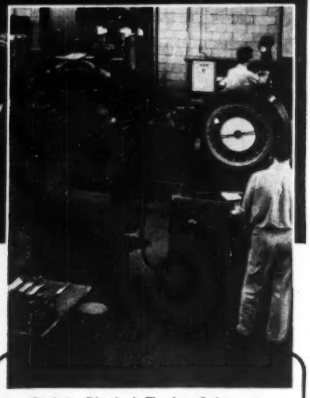
AT Globe, specialization is the keynote. Men, machines, and raw materials are all tailored to fit the Globe *specialized* process. Precision checks — and rechecks — at every stage of production insure Globe Tubes that meet *your* exacting specifications.

Be sure! Specify dependable, high-quality Globe Steel Tubes and be certain of getting the finest tubes available. Write for the General Catalog and become acquainted with Globe *specialized* process.

GLOBE STEEL TUBES CO., Milwaukee 46, Wisconsin

Chicago • Cleveland • Detroit • New York • Houston • St. Louis
Denver • San Francisco • Glendale, Cal. • Philadelphia

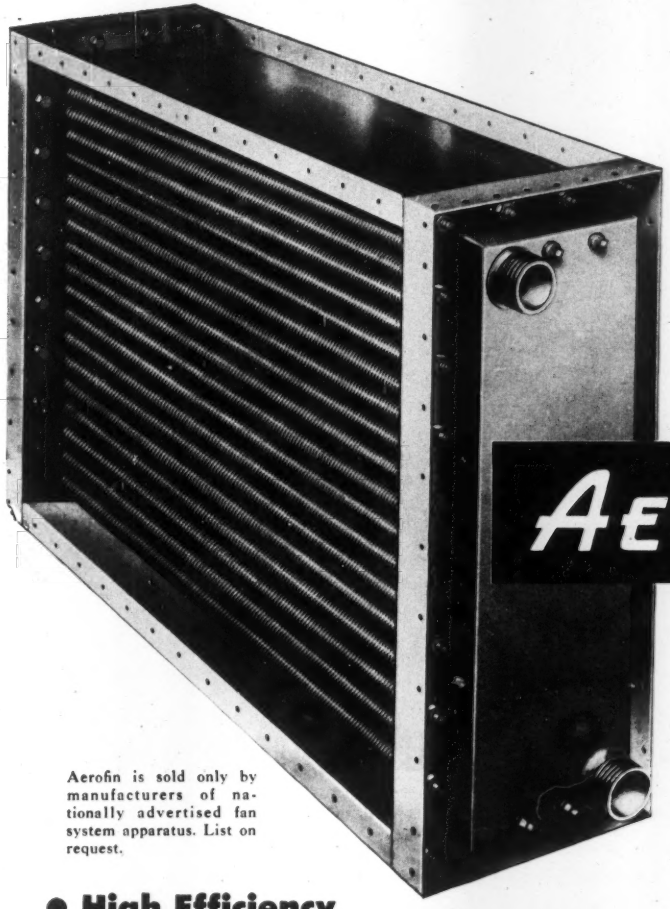
GLOBE TUBES



Globe's Physical Testing Laboratory — one of the seven different research and testing labs in Globe's House of Science.

GLOBE STEEL TUBES ARE AVAILABLE IN:

• Stainless Steels — Globe seamless • High Purity Iron — Globeiron • Stainless Steels Gloweld Welded • Corrosion Resistant Steels • Alloy Steels • Carbon Steel • High-Temperature Service Steels • Standard and Special Analysis Steels • Mechanical and Pressure Tubing



Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

AEROFIN

Heat-Transfer Surface

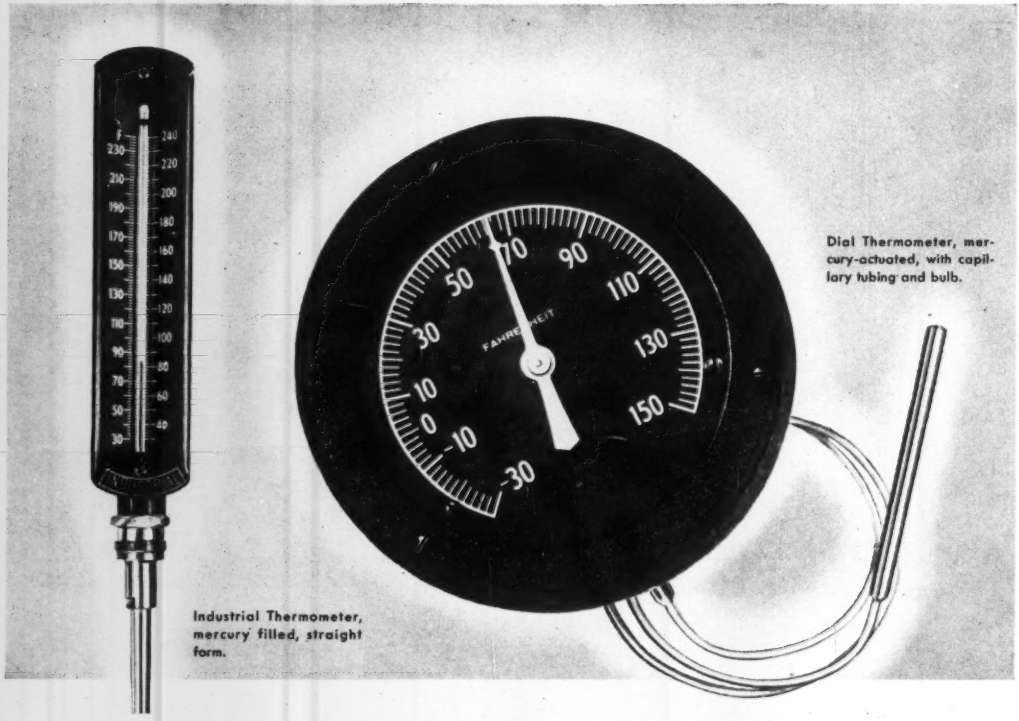
- **High Efficiency**
- **Long Service Life**
- **Low Maintenance Costs**

You are assured of high efficiency in heating or cooling — long service life — low maintenance and service costs, when you specify Aerofin extended-surface heat exchangers.

The reason is obvious: Aerofin makes heat exchangers *exclusively* — offers you the results of unequalled experience, unequalled production facilities, unequalled materials testing and design research — and the guidance of a complete, highly skilled engineering staff, at the plant and in the field.

For the most practical solution to your heat-exchange problem, ASK THE AEROFIN MAN.

AEROFIN CORPORATION 410 South Geddes St. SYRACUSE 1, N. Y.

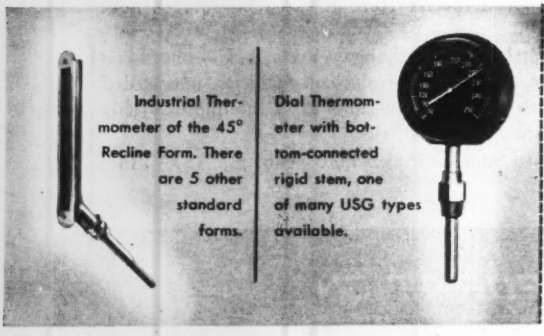

Dial Thermometer, mercury-actuated, with capillary tubing and bulb.
Industrial Thermometer, mercury filled, straight form.

HAVE YOU AN INDUSTRIAL TEMPERATURE TO TAKE?

Whenever an industrial temperature has to be taken there is a USG thermometer for the job. You have your choice of the Industrial Type in all sizes, and mounting forms with standard or protected stems; or the Dial Type in a variety of sizes, case styles, mountings, ranges, and connections. Gas, mercury or vapor-actuated.

For typical applications of commercial and approved Navy Standards, covering dimensional information and the use of bushings, flanges, sockets and special tubing, send for Catalogs 100 and 200.

Special thermometers for dough testing, milk testing, fuel gas, candy, solder baths, varnish, canning, vulcanizing and other unusual processes.



Industrial Thermometer of the 45° Recline Form. There are 5 other standard forms.

Dial Thermometer with bottom-connected rigid stem, one of many USG types available.

UNITED STATES GAUGE

United States Gauge
Division of American Machine and Metals, Inc.
Sellersville, Pa.

Gentlemen: We are interested in USG ☐ Industrial Thermometers; ☐ Dial Thermometers. ☐ Please send us your catalog. ☐ Have your man call. No obligation, of course.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

Whe... Air Filters . . .

FEEL THE FILTER PACK!

The soft, silky glass fibres are easy on the hands—and really stop Dust! The *magnified* view of the Glasfloss filter pack above shows why the long, fine curly fibres provide efficient filtering action. This fluffy, resilient mass provides an intricate maze of air passages with a greater surface area to catch and hold more dust throughout the entire pack. RESULT: Longer life, less changes, lower cost.

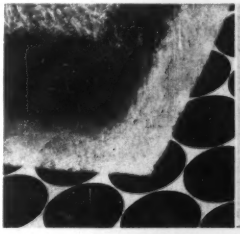
Glasfloss DISPOSABLE AIR FILTERS

- Hold more dust at higher efficiency
- Less resistance to the passage of air
- Insure greater air capacities
- Easier to handle during installation and removal
- Tough and resilient
- Highly fire resistant
- Moisture-proof

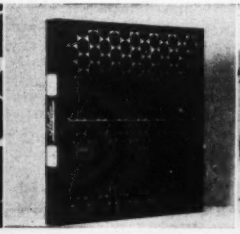
Glasfloss

MAKES A COMPLETE LINE OF DISPOSABLE AIR FILTERS

Descriptive literature on request—
Address Dept. HPAC 9



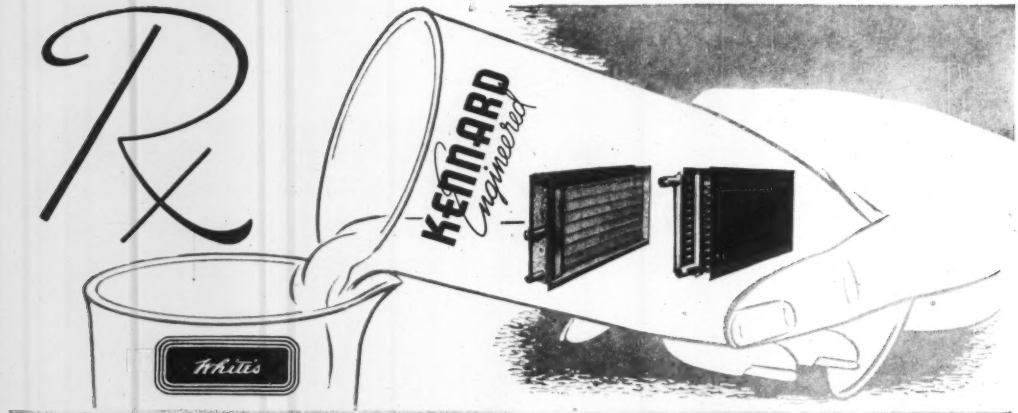
GLASFLOSS I-S
for heavy industrial use

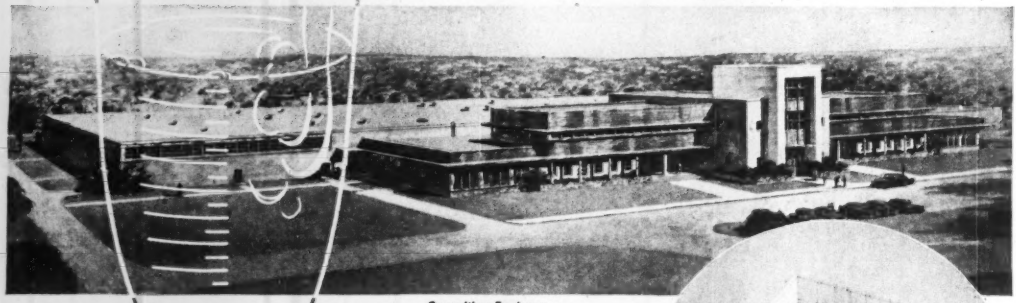


GLASFLOSS STANDARD
the all-purpose filter

GLASFLOSS ROLL-PAK
for economical bulk use

Glasfloss 155 EAST 44th STREET, NEW YORK 17, N. Y.





OFFICE, PLANT AND LABORATORIES
WHITE LABORATORIES, INC.
KENILWORTH, N. J.

Consulting Engineer:
A. M. Kinney, Inc., Cincinnati, Ohio
Contractor:
Frank A. McBride Co., Paterson, N. J. and
New York, N. Y

KENNARD Engineered

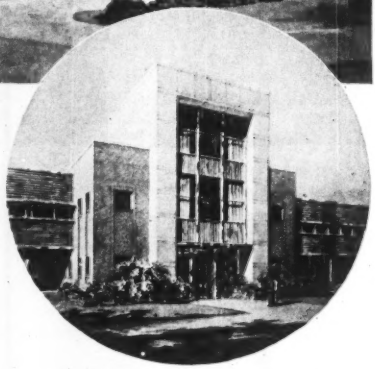
HEAT TRANSFER EQUIPMENT

was prescribed...

. . . . to help maintain the rigid standards set by White Laboratories in their manufacture of fine pharmaceuticals, chemicals and drugs; Kennard Chill Water Coils were specified using 1200 GPM of well water and 1700 GPM of chilled water to provide 1775 tons of air conditioning, and Kennard Steam Distributing Tube Coils to provide 24,645,000 BTUs/HR of heating.

These new buildings are among the most handsome and completely modern in the pharmaceutical and drug industry.

Kennard is justly proud to blend their name with White's.

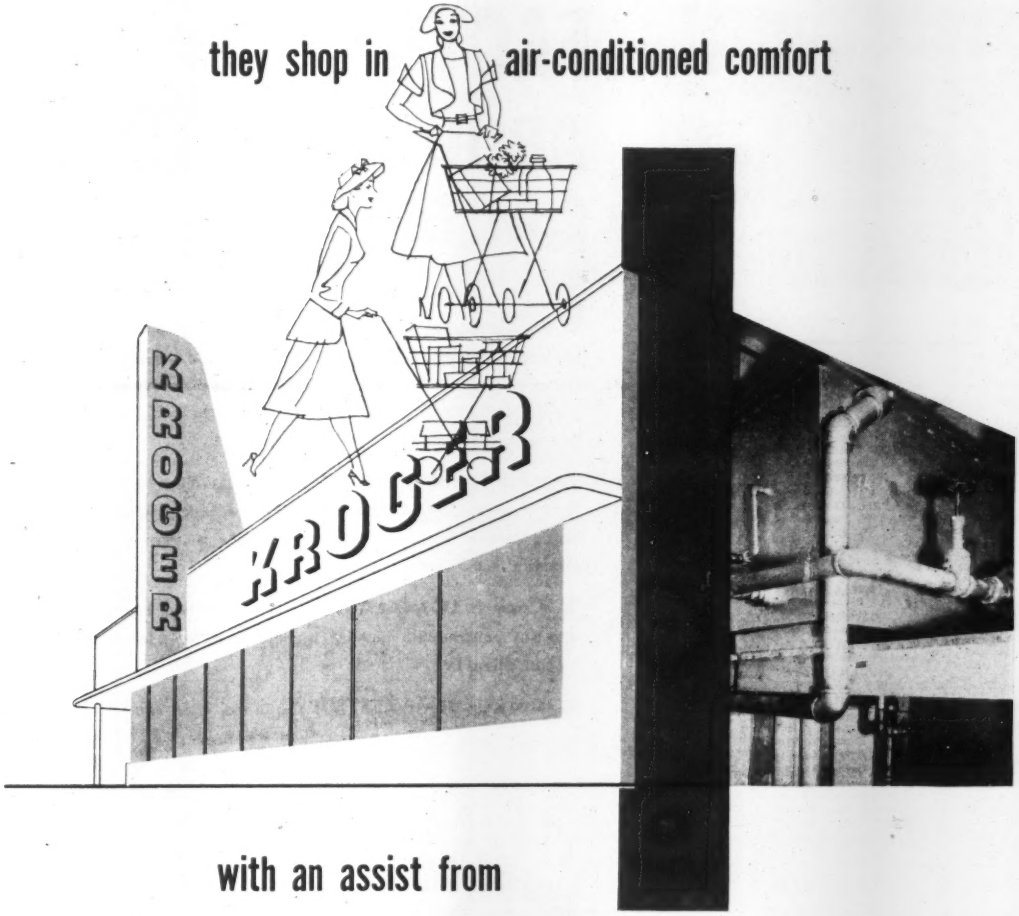


WRITE FOR CATALOGS AND BULLETINS

- No. 486—Air Conditioning Blower Units
- No. 494—Cooling Towers
- No. KT-1—Cooling Towers
- No. 491—Evaporative Condensers
- No. 47A—Finned Coils
- No. HV-1—Heating and Ventilating Units
- No. MZ-1—Multi-Zone Air Conditioning Blower Units
- No. SC-1—Sprayed Coil Dehumidifiers

KENNARD CORPORATION • 1817 S. HANLEY ROAD ST. LOUIS 17, MO., U.S.A.

they shop in air-conditioned comfort



with an assist from

SPANG® CW

Making certain their customers have the most pleasant of shopping conditions is a primary aim of Kroger Stores. Every element of design is carefully thought out to reduce shopping time and effort. In many stores there's even air conditioning for an extra margin of buyer comfort.

Like other owners who give extra attention to every design detail, Kroger uses Spang CW Steel Pipe extensively. In this Southeastern store, Spang CW is used exclusively for the plumbing, heating and air conditioning systems.

There's a good reason why Spang CW is so often first choice of careful owners, architects and contractors . . . it's the *quality-controlled* pipe. Beacuse of this careful control . . . especially during forming . . . it has exactly the right temper to give easy bending, easy cutting, easy threading.

True, you can't see the difference . . . but it's there. And the pay-off to you is in the extra reliability . . . faster installation and lower costs.

Don't just ask for pipe . . . ask for the *better* Spang CW Steel Pipe from your local Spang Distributor.

OWNER:
Consolidated Realty Investments, Inc., Atlanta, Georgia
ARCHITECT:
H. A. Rawlins, Atlanta, Georgia
GENERAL CONTRACTOR:
Consolidated Realty Investments, Inc., Atlanta, Georgia
PIPING CONTRACTOR:
Art Plumbing Company, Atlanta, Georgia

SPANG-CHALFANT
DIVISION OF THE NATIONAL SUPPLY COMPANY
General Sales Office: Pittsburgh 30, Pa. District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis.

..FACTS ABOUT CORK for Low Temperature . . .

CORK is one of the most useful materials known to man. Not only has it been in service longer than history can record, but its use has greatly increased with the need for modern industrial efficiency and economy. The reason for this is that Cork is completely unique in its physical structure and qualities. There's *nothing* like Cork!

1. Cork is MONEY-SAVING! Millions of dead-air cells in every square inch of Cork insulation cause it to serve as a most efficient *natural* barrier to heat flow. By its use, refrigeration is conserved to the most practical limits.

2. Cork is LONG-LASTING! Cork has high structural strength and is a most durable material. It continues to serve for many years at highest efficiency.

3. Cork is TIME-TESTED! The use of Cork insulation has kept pace with the development of refrigeration and cold storage. Its wide acceptance in these "heavy-duty" industries is due to its proved record for more than 40 years.

Write for FREE copy of Mundet Insulation Manual

4. Through more than 80 years as Cork specialists, we are able to preserve Cork's natural advantages in Mundet insulating products. Mundet engineers give you responsible assistance in building or expanding low temperature facilities. Let us help you secure low operating cost and maximum service. Mundet Cork Corporation, Insulation Division, 7101 Tonnelle Avenue, North Bergen, N. J.

Mundet district offices are conveniently located coast-to-coast.

ATLANTA
339-41 Elizabeth Street, N.E.
BALTIMORE 30
612 Battery Ave.
BOSTON
57 Regent St., North Cambridge 40
CHARLOTTE 6, N. C.
2301 N. Davidson St.
CHICAGO
35 E. Wacker Drive
CINCINNATI
427 West 4th Street
DALLAS 10
601 Second Ave.
DETROIT 21
14401 Prairie Avenue
HOUSTON 1
Commerce and Palmer Streets
INDIANAPOLIS
56 E. Merrill St.
JACKSONVILLE 6, FLA.
800 E. Bay St.
KANSAS CITY 7, MO.
1700 Brooklyn Ave.
KNOXVILLE
1221 Grand Avenue
LOS ANGELES
(Maywood)
6116 Walker Avenue
NEW ORLEANS 16
315-25 N. Front Street
NEW YORK 17
331 Madison Ave.
PHILADELPHIA 39
856 N. 48th Street
ST. LOUIS 9
3176 Brannon Ave.
SAN FRANCISCO 7
440 Brannan Street
WASHINGTON D.C.
600 F Street, N.W.

In Canada:
Mundet Cork & Insulation, Ltd.
35 Booth Avenue, Toronto

Write us for name of our nearest representative if there is no Mundet office in your city.

MUNDET CORKBOARD
•
MUNDET CORK PIPE COVERING
•
MUNDET CORK LAGGING

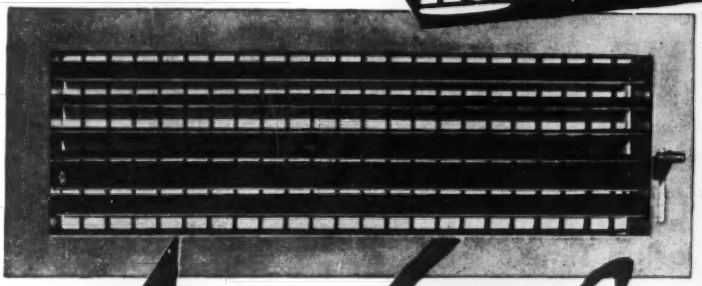
MUNDET CORK INSULATION

CONSERVES LOW TEMPERATURE

MAKES ANY AIR CONDITIONING SYSTEM A BETTER AIR CONDITIONING SYSTEM

Yet it COSTS LESS . . . . . .

● *Illustrated below—* #276 4-way multi-shutter register . . . features front louvers and rear damper blades parallel to long dimension . . . second row louvers parallel to short dimension.



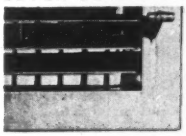
AirFoil

4-WAY MULTI-SHUTTER REGISTER

SOLID-SECTION AIRFOIL LOUVER

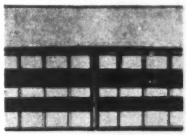
● Louver knifes air in wind tunnel tests. Turbulence has been almost eliminated giving noiseless control of air.

LEVER CONTROL



● Inconspicuous lever in face of frame controls dampers for complete shut-off.

EXTRA-STRENGTH FRAME . . . . .



● New, exclusive Titus concealed support eliminates unsightly mullions and butted construction.

The smartly designed #276 combines *4-way #270 grille* with the *multi-shutter damper* to assure maximum directional control with positive volume control and shut-off. Damper blades interlock for complete shut-off.

The two front sets of louvers are individually adjustable with blades on ¾ inch centers.

Dampers are controlled from face of grille by inconspicuous lever. Removable lever furnished at no extra cost.

EXTRA STRENGTH—LONGER LIFE

Sound, inspired know-how engineering gives the #276 superb simplicity of design with no unnecessary parts—no clumsy bulk. A special patented, *concealed support* eliminates unsightly mullions and butted construction permitting superior strength with no added weight.

EASY TO INSTALL

#276 grilles are light in weight—easy to carry—easy to fit—easy to put in place. *Save much costly time and labor.*

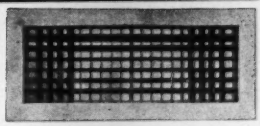
EXTRA VALUE AT LOWER COST

AIRFOIL grilles are priced down to give you more value—more performance—more efficiency—at less cost.

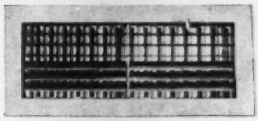
NOTE THESE OUTSTANDING AIRFOIL FEATURES . . .

- Smooth-as-glass AIRFOIL louvers.
- Extra-heavy frames.
- Airtight rubber gasket.
- Positive shut-off.
- Individual louver adjustment.
- Removable lever.

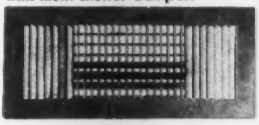
LOOK TO AIRFOIL FOR THE FINEST



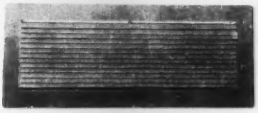
L-270 4-way directional grille for complete control of air stream.



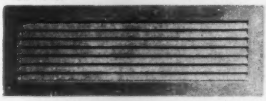
L-274 Double directional grille with multi-shutter damper.



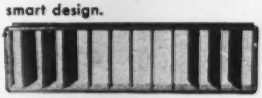
S-8 4-way grille with louvers on ½" spaced front.



RL-21 Return air grille of fixed deflection type with closely spaced louvers.



RL-230 Return air grille incorporates rugged construction and smart design.



AG-25 Volume controller designed to fit behind grille.

CHECK TYPE OF GRILLE ON WHICH INFORMATION IS DESIRED

- ☐ Air conditioning outlets
- ☐ Perforated metal and ornamental grilles
- ☐ Return air grilles and registers
- ☐ Door ventilators
- ☐ Volume controllers
- ☐ Special made-to-order grilles

TITUS MANUFACTURING CORP., WATERLOO, IOWA

___Rush Information on 27.
___Send complete catalog.
___Send literature on above checked items.

NAME_____

ADDRESS_____

CITY_____ STATE_____

ALLIS-CHALMERS

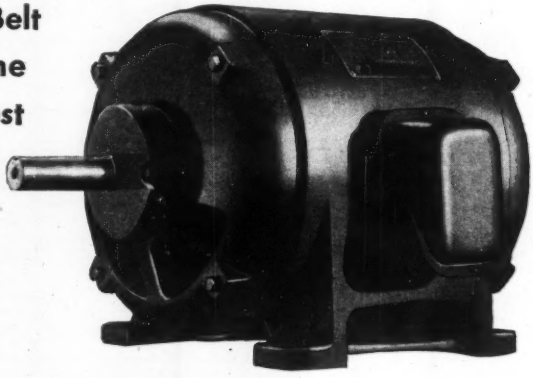
Simplify

YOUR DRIVE DESIGN PROBLEMS

Allis-Chalmers Matched Motors, Control and V-Belt Drives Save Design Time and Cut Installation Cost

CONTROL

Complete matched control for any motor, including manual and magnetic starters, pushbuttons, and variable speed control.



MOTORS

Standard open drip-proof, splash-proof, totally-enclosed, fan-cooled and explosion-proof, ½ hp and up. Also wound rotor and direct current. Special motors to meet your requirements.

Texrope V-BELT DRIVES

Fixed speed and *Vari-Pitch* sheaves with stationary or motion control. Famous grommet belt construction. Most complete line of V-belt drive equipment in the industry.

Get the Kind of Help You Need

Allis-Chalmers representatives in every industrial center are at your command. Just call the office nearest you or write Allis-Chalmers, Milwaukee 1, Wisconsin for helpful literature.

Allis-Chalmers Motors and Control	51B6052
Texrope V-Belt Drives	20B6051

Texrope and Vari-Pitch are Allis-Chalmers trademarks.

A-3780

ALLIS-CHALMERS

You've got a Winning Combination

A STANDARD ISA FACE-TO-FACE DIMENSIONS
K "FLOW-LINE" CONTOURED BODY
Q STELLITED SEATING SURFACES
J
10 SEAT RINGS EASILY REPLACED WITH VALVE IN PIPE LINE

with the New

TRADE **LESLIE** MARK

DOUBLE SEATED DIAPHRAGM CONTROL VALVES

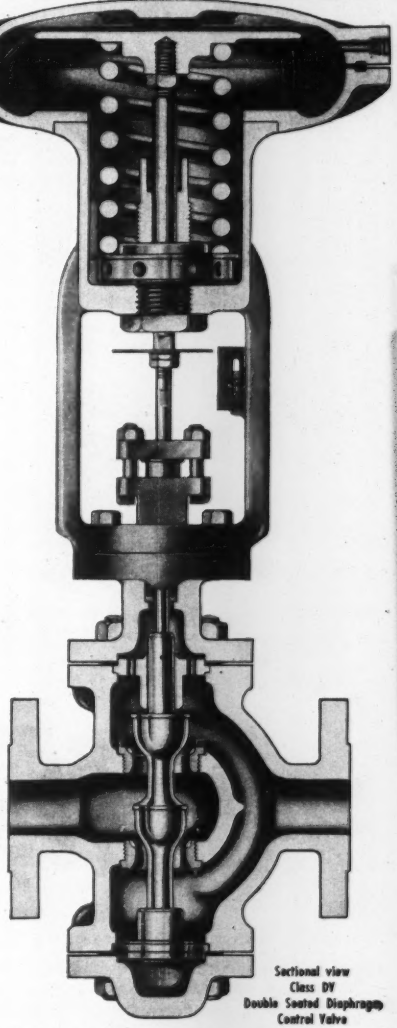
Calling a spade a spade you've got a "royal flush" of features in these new Valves designed for use with control instruments.

Their "Flow-Line" Contoured Bodies have ISA standard face-to-face dimensions and high capacity, low turbulence and minimum body pressure drop characteristics.

A new type, top and bottom guided construction is self-aligning and non-binding regardless of uneveness of bolt tightening.

Standard, integral stellited seating surfaces are recommended for steam service to reduce seat ring thread corrosion. Renewable, interchangeable seat rings also furnished where desired and may be easily replaced without removing valve body from the line. Elaborate grinding at high temperatures is completely eliminated.

With these Valves, you get as *standard equipment*, features heretofore only obtainable in expensive, specially designed valves.



Sectional view
Class DY
Double Seated Diaphragm
Control Valve

Look for LESLIE REGULATORS under "Valves" or "Regulators" in your classified telephone directory in the following cities where LESLIE factory trained engineers are located:

Albany, N. Y.	Chicago, Ill.	Galveston, Tex.	Memphis, Tenn.	Orlando, Fla.	Salt Lake City, Utah
Albuquerque, N. M.	Cincinnati, Ohio	Greenville, S. C.	Miami Springs, Fla.	Philadelphia, Pa.	San Francisco, Calif.
Atlanta, Ga.	Cleveland, Ohio	Houston, Texas	Milwaukee, Wis.	Pittsburgh, Pa.	Seattle, Wash.
Baltimore, Md.	Dallas, Texas	Indianapolis, Ind.	Minneapolis, Minn.	Ponca City, Okla.	St. Louis, Mo.
Beaumont, Tex.	Denver, Colo.	Kansas City, Mo.	Mobile, Ala.	Providence, R. I.	Syracuse, N. Y.
Birmingham, Ala.	Des Moines, Ia.	Kingsport, Tenn.	Monroe, La.	Richmond, Va.	Tucson, Ariz.
Boston, Mass.	Detroit, Mich.	Los Angeles, Calif.	New Orleans, La.	Rochester, N. Y.	Wilkes-Barre, Pa.
Bridgeport, Conn.	El Paso, Tex.	Louisville, Ky.	New York, N. Y.	Rutherford, N. J.	Wilmington, Calif.
Buffalo, N. Y.					Youngstown, Ohio

Bruxelles-Forest, Belgium

Montreal, Que., Can. • Ottawa, Ont., Can. • Toronto, Ont., Can. • Vancouver, B. C., Can. • Welland, Ont., Can.

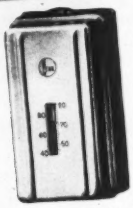
WRITE FOR **Bulletin 513**

ESTABLISHED 1900
LESLIE CO.
1707

237 Grant Avenue, Lyndhurst, New Jersey

FLOATLESS LEVEL CONTROLS • PRESSURE REDUCING VALVES • • PRESSURE CONTROLLERS
SELF CLEANING STRAINERS • PUMP GOVERNORS • TEMPERATURE REGULATORS
• AIR HORNS • STEAM WHISTLES

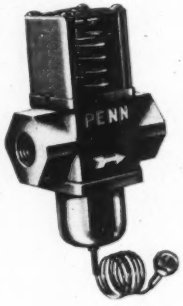
Penn Series 270 temperature and pressure controls incorporate 2-pole construction and a direct-reading calibrated scale which shows both cut-in and cut-out points.



Penn Unit Heater Thermostat features "heat anticipation" and a built-in "on-off" switch. Cooling Thermostats and Humidistats are also available in the Penn line.

Series 275 Oil Protection Control with built-in Time Delay Switch for protection of all pressure-lubricated refrigeration compressors.

Penn Series 221 Solenoid Valves are direct acting and may be used with all non-corrosive refrigerants as well as for water, oil or air.

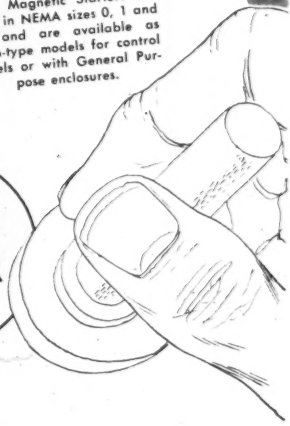


Series 246 Water Valves are built in threaded and flanged styles for all refrigerants and in sizes from ⅜" to 2½".

Penn Magnetic Starters are built in NEMA sizes 0, 1 and 1½ and are available as open-type models for control panels or with General Purpose enclosures.

THE BEST TEST...

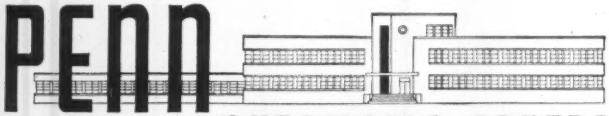
REPEAT ORDER



Once you try PENN controls, you'll use them on every air conditioning, refrigeration and space heating application. Contractors and users have learned that *performance on the job* is the strongest recommendation for PENN automatic controls.

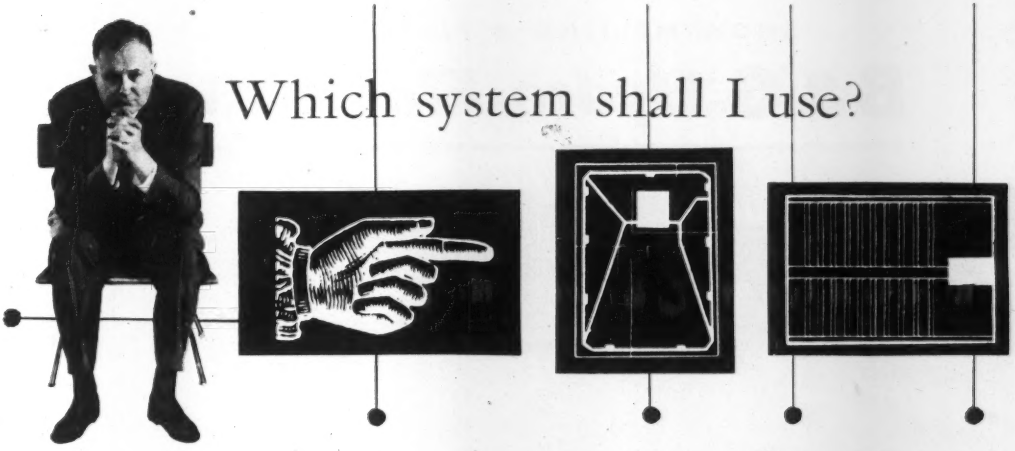
And this outstanding performance... this dependability and long-life accuracy result in greater customer satisfaction, more sales, more net profits.

Take the first step in trying these better controls. Get the *new* PENN Condensed Catalogs... one on heating and the other on refrigeration controls... they're FREE. Ask your wholesaler or write **Penn Controls, Inc., Goshen, Indiana.** Export Division: 13 E. 40th Street, New York 16, N. Y., U. S. A. In Canada: Penn Controls Limited, Toronto, Ontario.



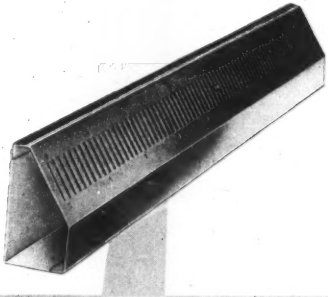
AUTOMATIC CONTROLS

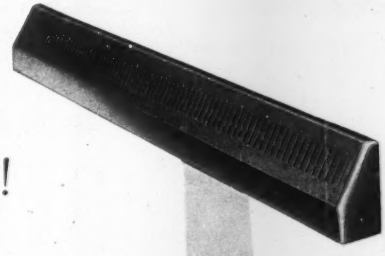
FOR HEATING, REFRIGERATION, AIR CONDITIONING, PUMPS, AIR COMPRESSORS, ENGINES, GAS RANGES



Which system shall I use?

Standard's perimeter baseboard registers work with them all!





for loop, lateral, crawl-duct, and all other systems, they're best!

Standard's Perimeter Baseboard Registers, illustrated model C-F5, feature all the latest developments of perimeter heating and are the finest, most efficient registers on the market today. Each four-foot section has its own individually operated damper control, easily adjustable for minimum, medium, and maximum volume control. Standard's Perimeter Baseboard Registers spread warm air along the baseboards and do away with concentrated heat drafts that fade to cold spots in room interiors.

features:

- Each section controlled individually.
- Efficient Snap-on end caps.
- Heavy-duty construction of 20-gauge steel.
- Finished in prime coat . . . special finishes on request.
- Simplifies balancing of heating system.
- Comes in 4-foot sections with separate butt straps for continuous installation.
- Set*LOK feature for positive air control available at slight extra cost.

Ideal for use in homes, schools, churches, and commercial installations. Also available as C-F4. Both designs have sliding damper control. Adaptable for year-round air conditioning.

Standard Stamping & Perforating Co.

3135 W. 49th Place Chicago 32, Illinois

For more information, and a copy of Standard's New Pocket Catalogue, showing complete line of registers and grilles, *Mail Coupon Today.*

Standard Stamping and Perforating Co. Dept. H
3135 West 49th Place, Chicago 32, Illinois

Gentlemen: Please send me more information about Standard's Perimeter Baseboard Registers and a copy of your Pocket Catalogue, at no obligation to me:

Name_____

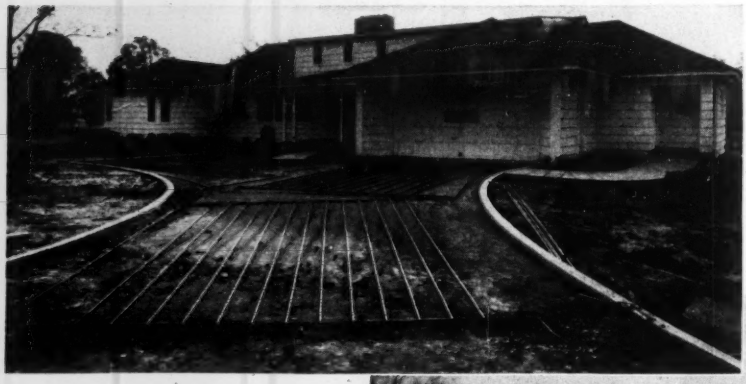
Firm_____

Address_____

City_____ ***State***_____

SNOW MELTING A *PLUS* VALUE OF

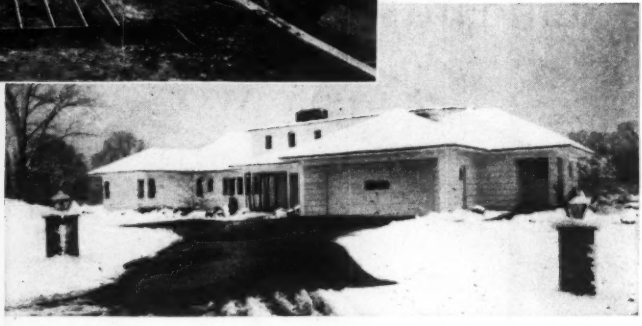
B & G *Hydro-Flo** Heating

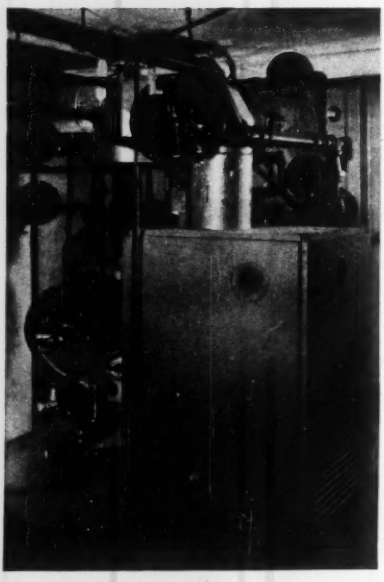


● *The residence of E. E. Dohn, Syracuse Heating Supply, Inc., Syracuse, N.Y.*

● *Pipe coils for circulating hot water under driveway.*

● *Snow melts as fast as it falls on the heated driveway.*





Boiler hook-up in the Dohn residence.

Here's one more reason the B & G *Hydro-Flo* System is tops in modern heating. Hot water can be circulated by a B & G Booster Pump through pipe coils under driveways and sidewalks, melting snow as fast as it falls. Another back-breaking job eliminated . . . another strong selling point!

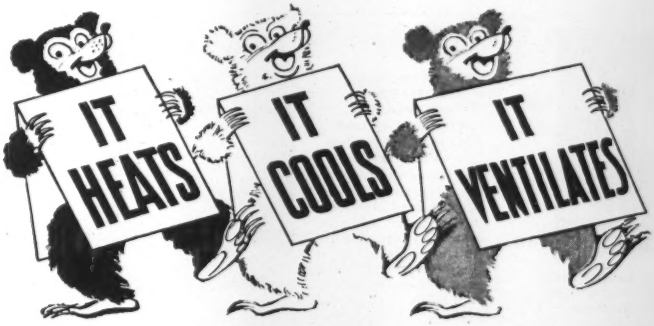
B & G *Hydro-Flo* Heating assures better, more economical *radiant* heating in buildings of every size and character. At every weather change, the system *automatically* varies the heat input, so that indoor temperature is uniformly comfortable. This close control of the heat supply obviously results in exceptional fuel economy.

Add to all this the advantages of a limitless supply of domestic hot water . . . 24 hours a day, summer and winter.

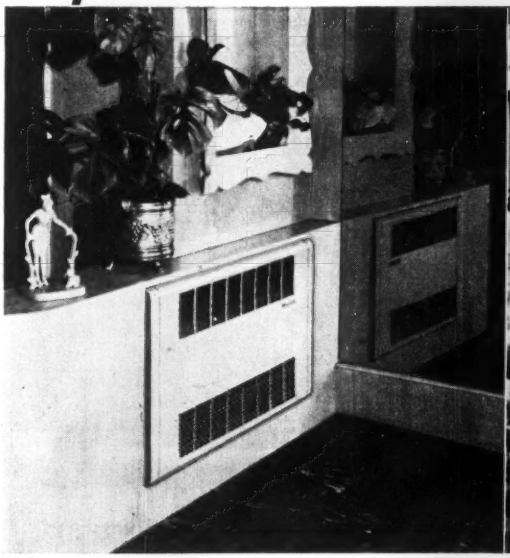
The photo at the left shows some of the B & G equipment used in the installation illustrated here. It includes B & G Booster Pumps, Flo Control Valves, ASME Relief Valve, Airtrol Tank and Boiler Fittings for eliminating air from the system and a Comfort Control System—a wind-compensating, indoor-outdoor temperature control.

BELL & GOSSETT
COMPANY
Dept. CQ5, Morton Grove, Ill.

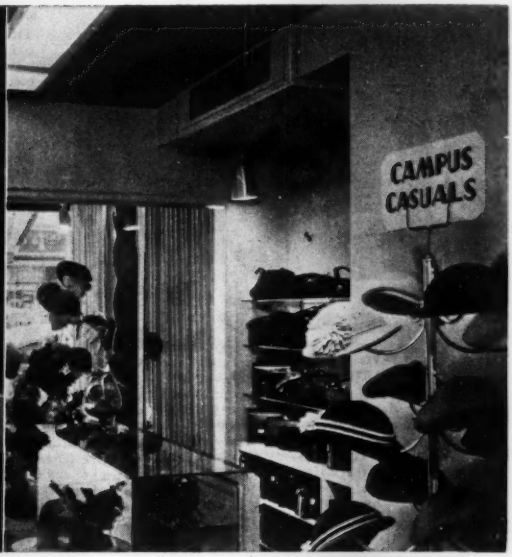
Canadian License: S. A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto, Canada
*Reg. U. S. Pat. Off.



Yes, Modine Cabinet Unit gives you ALL 3!



TYPE FF for heating only. Basic unit designed for exposed or recessed installation. Floor, wall or ceiling mounting.



TYPE BT for heating, cooling (in floor-mounted position), ventilating, with or without ducts. Floor, wall or ceiling mounting.

IF you need economical equipment for heating, cooling and ventilating—and the expense of unit ventilators or air conditioners is not warranted—you'll find the perfect answer in Modine's newly expanded line of Cabinet Units.

Here, in a single unit, you can get quick, positive, quiet distribution of heated or cooled air . . . with or without ducts. Inexpensive accessories permit introduction, filtering, heating and distribution of fresh outside air for ventilation.

Whether it's new construction or modernization work—Modine Cabinet Units harmonize perfectly with any interior. You can choose from five different models—some for heating with steam or hot water only . . . others for heating plus cooling with chilled water.

Next time you have a heating application for commercial, institutional or public buildings—check Modine Cabinet Units. They're the low-cost answer to year 'round comfort.

Modine CABINET UNITS

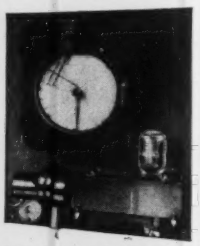
Tear out coupon and mail today for your free copy of 28-page, profusely illustrated Bulletin 552. Or see your Modine representative listed in your classified phone book.

MODINE MFG. CO.
1509 DeKoven Ave., Racine, Wis.

Please send me immediately a free copy of 28-page Bulletin 552, "Modine Cabinet Units."

Name.....
Firm.....
Address.....
City..... Zn.... State.....

C-1166

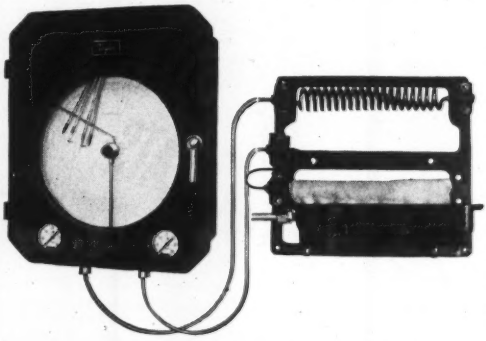


RECORDING OR RECORDING-CONTROLLING HYGROMETER with motor driven fan

Recommended where air circulation would be inadequate to assure average condition across bulbs. Motor-driven fan produces air velocity of more than 600 ft. per minute.

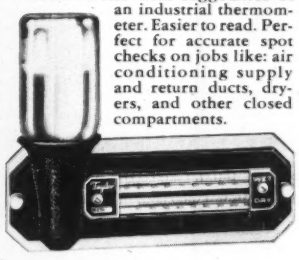
RECORDING OR RECORDING-CONTROLLING HYGROMETER with bottle or continuous water feed

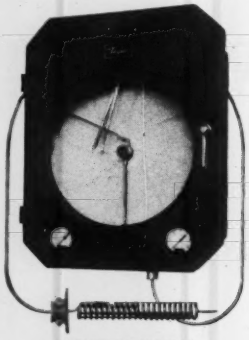
Recommended under the following conditions: Good air circulation; panel advantageously located within apparatus room or duct for best circulation across the bulbs. Available with bottle-feed or continuous water supply.



TAYLOR 108G HYGROMETER

With bottle-fed reservoir. Combines accuracy of an etched stem thermometer with ruggedness of an industrial thermometer. Easier to read. Perfect for accurate spot checks on jobs like: air conditioning supply and return ducts, dryers, and other closed compartments.



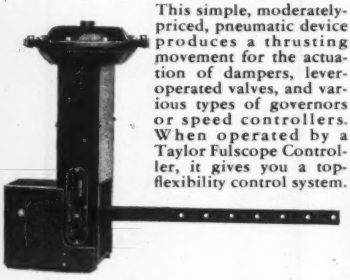


TAYLOR FULSCOPE* TEMPERATURE CONTROLLER

Keeps lever motors, diaphragm valves, dampers, etc., in proper sequence to make your air conditioning system work perfectly. Automatically compensates for load changes. Controls refrigeration compressors. Gives you automatic seasonal changeover.

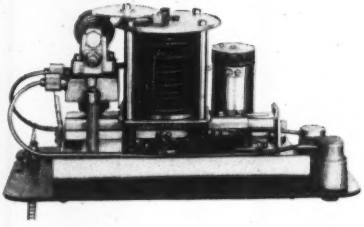
TAYLOR MOTOSTEEL* LEVER MOTOR

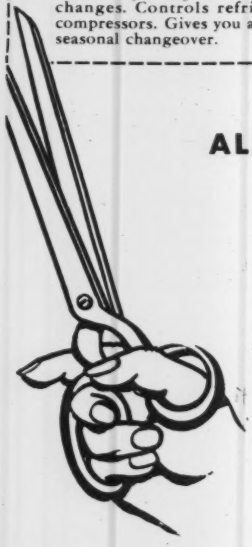
This simple, moderately-priced, pneumatic device produces a thrusting movement for the actuation of dampers, lever-operated valves, and various types of governors or speed controllers. When operated by a Taylor Fulscope Controller, it gives you a top-flexibility control system.



TAYLOR TRANSAIRE* TEMPERATURE TRANSMITTER

New force-balance pneumatic transmitter that meets all normal air conditioning requirements with Simple Operation, Positive Transmitting action and Rapid Response to Temperature Changes. Ideal where zones are remotely located from centralized control room.





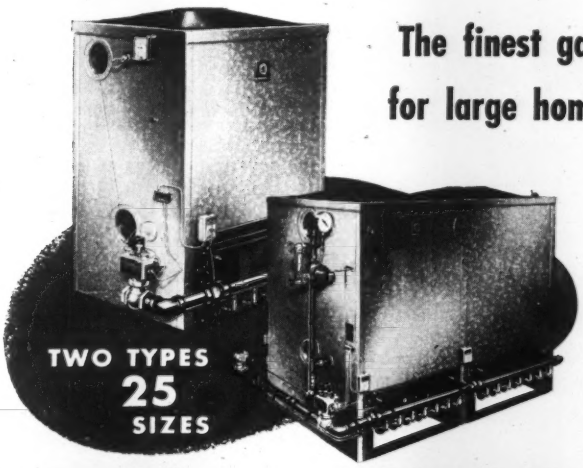
ALL OF THESE INSTRUMENTS ARE

CUT OUT FOR YOU!

IF YOU NEED any of the instruments on this page, ask your Taylor Field Engineer or write for **Catalog 5.** Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.*

*Reg. U. S. Pat. Off.

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY



The finest gas boilers on the market for large homes and larger buildings!

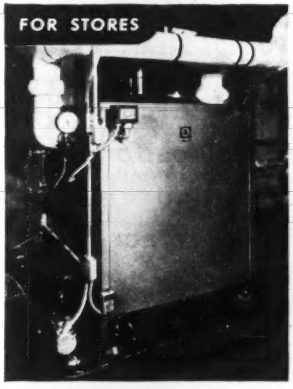
STANDARD BOILERS

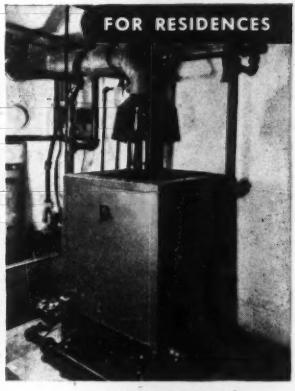
by AMERICAN-Standard

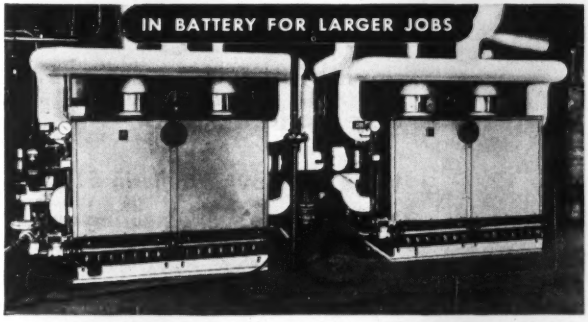
● Designed by experts in the field of gas heating, Standard boilers are outstanding examples of good engineering and manufacturing skill. Heating surfaces, burners, controls and other essential features are coordinated to assure maximum heat output with lowest operating and maintenance cost.

Made in two types—1-G and 4-G—and in twenty-five sizes, these top quality boilers provide effortless gas heating in large homes, apartment buildings, hospitals, and in various commercial and industrial buildings. Furthermore, they can be used in batteries in larger buildings to provide an extremely flexible heat source through the operation of one or more units, thus giving added economy in mild weather, as well as perfect comfort in the coldest weather.

Standard boilers and other gas fired heating equipment in the American-Standard line are sold through selected wholesale distributors to heating contractors. **American Radiator & Standard Sanitary Corporation,** P.O. Box 1226, Pittsburgh 30, Pa.







Precision-machined and sub-assembled to facilitate quick and easy installation

Standard boilers have cast-iron sections which are precision-machined to facilitate quick and easy assembly. Individual sections may be conveniently carried through any ordinary doorway. To save further time and labor, controls, valves, and control piping are factory-assembled as far as possible.

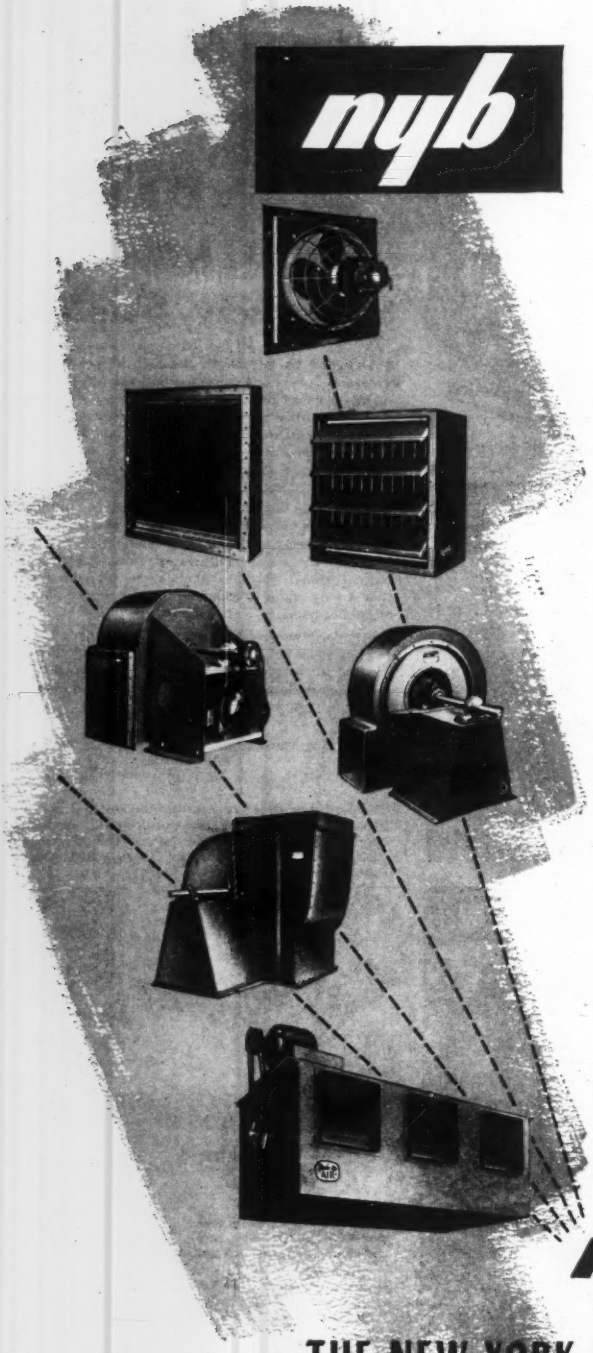
NEW DATA BOOK Now Available!

A comprehensive, instructive manual to help you select and install any type of radiator heating equipment in the American-Standard line. Ask your wholesaler for your copy. Form No. 220.

AMERICAN-Standard
HEATING

Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON



nyb

Investigate

STEELFIN!

It has everything you want in Heavy Duty Heat Surface

BUILT TO MEET MODERN INDUSTRIAL REQUIREMENTS

FOR CONTINUOUS HEAT SERVICE UP TO 150 POUNDS STEAM PRESSURE

The rugged arc welded construction outperforms and outlasts heating elements made of thinner non-ferrous metals, avoids their expansion-contraction faults, yet has the same BTU efficiency.

Originated in 1922, it has an enviable record of dependable performance.

Write for copy of Bulletin 514, also 492 which gives engineering details.

FANS • BLOWERS • UNIT HEATERS • MAKE-UP AIR UNITS • HEAVY DUTY HEAT SURFACE

nyb

SEE OUR CATALOG IN SWEET'S

THE NEW YORK BLOWER COMPANY

SALES OFFICES • 32nd STREET and SHIELDS AVENUE • CHICAGO 16

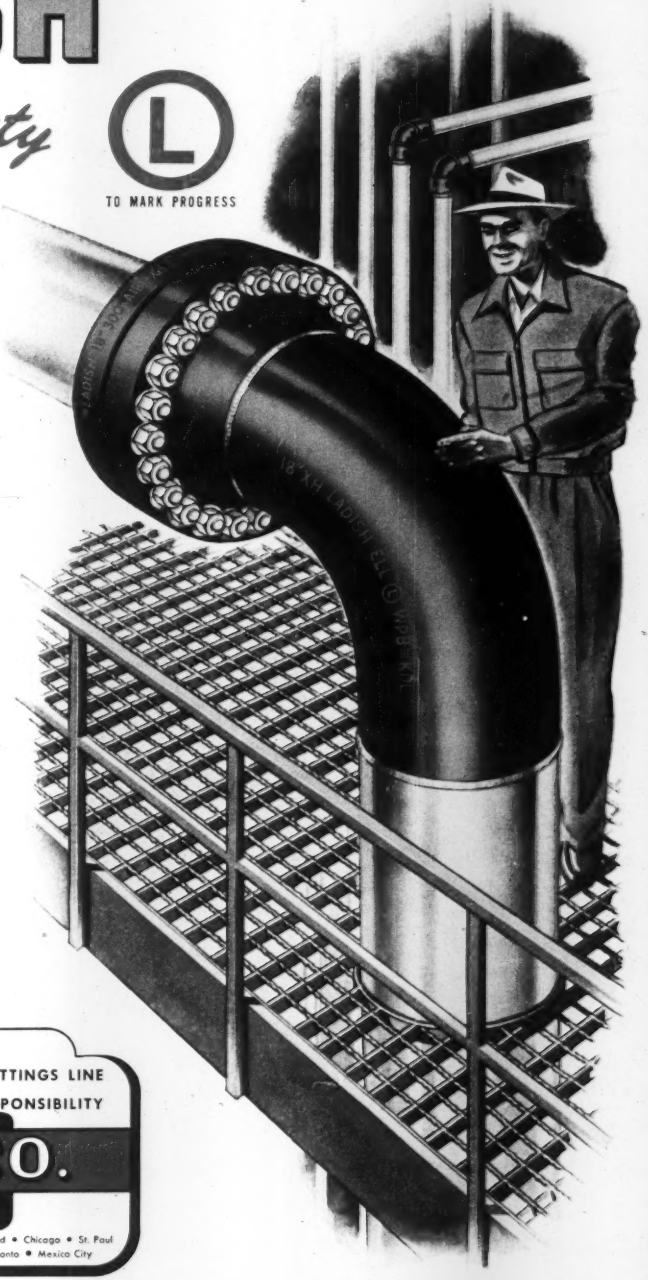
FACTORY, LAPORTE, INDIANA

LADISH

Controlled Quality

PIPE FITTINGS

TO MARK PROGRESS



metallurgically sound for maximum service

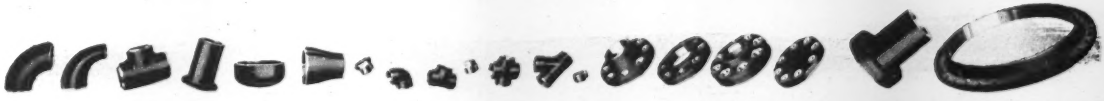
Sound metallurgy . . . the result of unsurpassed facilities and advanced laboratory controls . . . provides the maximum of dependability in Ladish Controlled Quality fittings. Every phase of metal quality . . . composition, structure and physical properties . . . is continuously safeguarded—and certified proof of metallurgical integrity is available to users of Ladish fittings.

THE COMPLETE *Controlled Quality* FITTINGS LINE
PRODUCED UNDER ONE ROOF...ONE RESPONSIBILITY

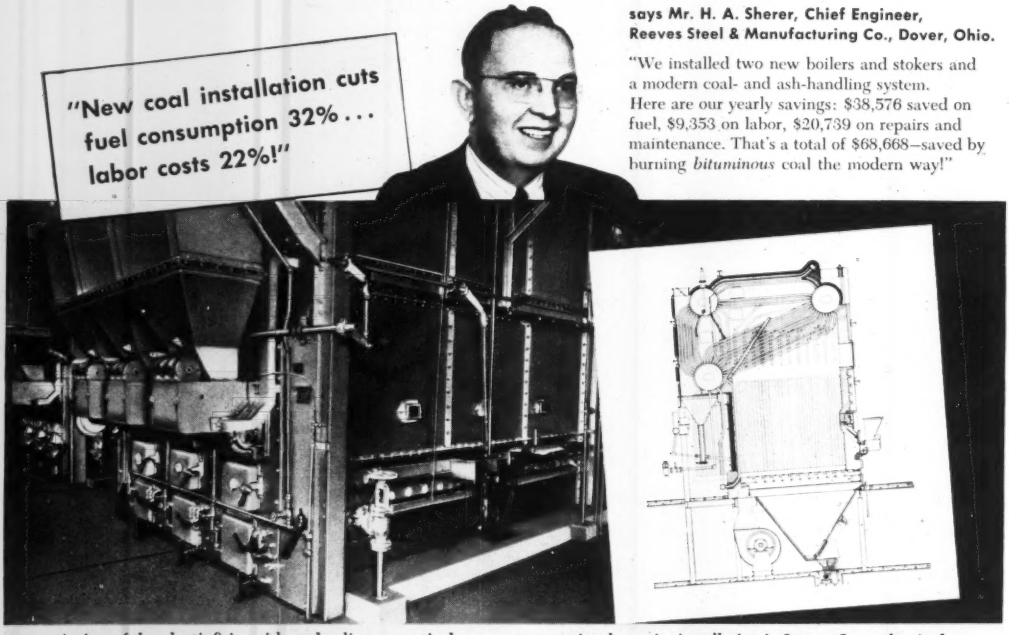
LADISH CO.

CUDAHY, WISCONSIN
MILWAUKEE SUBURB

District Offices: New York • Buffalo • Pittsburgh • Philadelphia • Cleveland • Chicago • St. Paul
St. Louis • Atlanta • Houston • Tulsa • Los Angeles • Havana • Toronto • Mexico City



"WE SAVE OVER $68,000 A YEAR— BY BURNING COAL THE MODERN WAY!"



says Mr. H. A. Sherer, Chief Engineer, Reeves Steel & Manufacturing Co., Dover, Ohio.

"We installed two new boilers and stokers and a modern coal- and ash-handling system. Here are our yearly savings: $38,576 saved on fuel, $9,353 on labor, $20,739 on repairs and maintenance. That's a total of $68,668—saved by burning *bituminous* coal the modern way!"

A view of the plant's firing aisle and a diagrammatic drawing of one of the boilers. It now costs 18.8¢ less to generate every thousand lbs. of steam. This is a saving large enough to amortize the entire installation in 3 years-3 months. And that includes all the cost incurred in tearing out old equipment and constructing a new plant floor!

● Today, *bituminous* coal's inherent economy has been greatly increased. Modern combustion installations give you more steam for every dollar . . . automatic coal- and ash-handling systems cut labor costs to a minimum.

A consulting engineer can show you how coal can do a better job—*and save you real money*—in a plant designed to meet your *specific* needs.

In addition, with coal you get the basic advantages of price stability, and dependable supply. These advantages are assured by America's virtually inexhaustible coal reserves and the high productivity of America's coal industry.

If you operate a steam plant, you can't afford to ignore these facts!

COAL in most places is today's lowest cost fuel.

COAL resources in America are adequate for all needs—*for hundreds of years to come.*

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

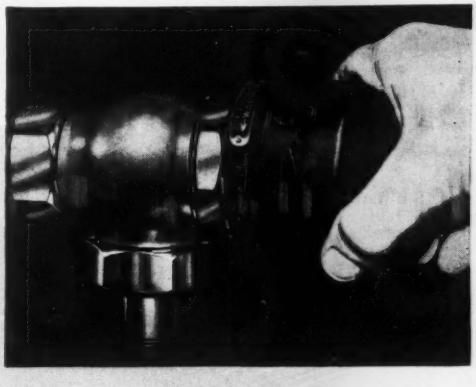
BITUMINOUS COAL INSTITUTE

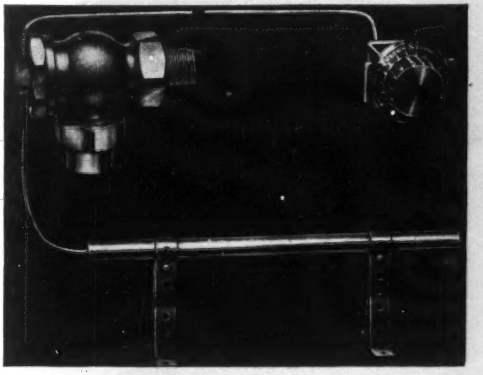
A Department of National Coal Association, Washington, D. C.

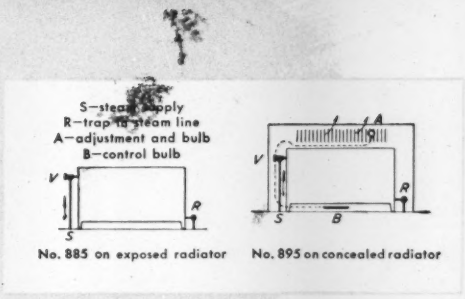
FOR HIGH EFFICIENCY FOR LOW COST

YOU CAN COUNT ON COAL!

Illustrated—two basic types of Sylphon automatic radiator valves. Right, for exposed radiators. Left, for enclosed radiators. Both available in angle and globe bodies.







SIMPLIFIED SYSTEM *for low-cost room comfort!*

SYLPHON AUTOMATIC RADIATOR VALVES provide a simple, efficient way to get greater room comfort at lower cost—all winter long. See how effectively—how economically—they do the job.

1. These easily adjustable radiator valves assure uniform temperature control at all times—whether it's in one room, a large office or an entire building. Temperature is *kept* even. No discomfort. Result—comfort conditions and occupant efficiency are improved.

2. They substantially reduce heating costs. For studies show that during 95 per cent of the average winter season, more heat is generated than needed for healthful comfort. With Sylphon Automatic Radiator Valves controlling temperature to meet requirements, fuel is saved.

3. They cost less than any other automatic controlling system available. Easily and quickly installed on your present radiators. Simply constructed, self-powered and packless, they are self-contained and fully modulating. They pay for themselves many times over in fuel savings alone. For complete information, send for Bulletin RH-80.

FIRST WITH BELLOWS

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON
DIVISION

ROBERTSHAW-FULTON CONTROLS CO. KNOXVILLE 4, TENN.

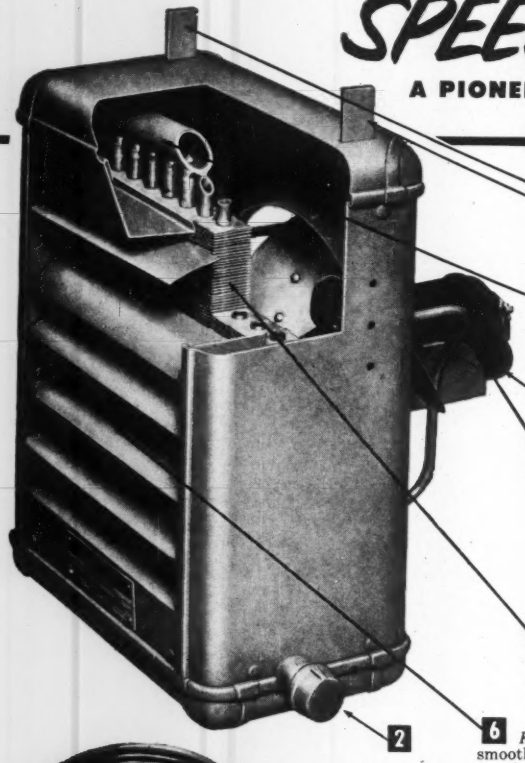
Canadian Representatives, Darling Brothers, Montreal

COMPARE EVERY POINT...

AND YOU'LL CHOOSE WESTINGHOUSE

SPEEDHEATERS®

A PIONEER NAME IN UNIT HEATERS



1 *Handy Hangers*—Easily-formed, pliable steel hangers furnished at no extra cost.

2 *Piping Connections*—On either side. Supply and return lines can be connected to whichever side is most convenient for installations.

3 *Dependable Westinghouse Motor*—Quiet running, totally enclosed motors. Low starting current and resilient mountings make them ideal for Unit Heater duty.

4 *Motor Service Plan*—Replacement motors are available on exchange basis from 36 Westinghouse stocking points across the nation.

5 *Single Row Radiator*—Means less air resistance; longer heat throw; more comfortable leaving-air temperatures.

6 *Fast Heat Delivery*—Fan designed for smooth flow of large air volume; gives fast heat, quiet operation at lower power costs.

THE DOWNBLAST SPEEDHEATER is tops for high ceiling installations. It forces warm air *down* into working areas where it is needed.

Compare them all, on every point. Get the inside story . . . check for yourself the fast, economical heat delivery that Speedheaters offer at no extra cost. You'll find that Speedheaters are *right* for your needs, give you the *most* for your money, are the *finest* you can buy.

Speedheaters are available in 82 standard heating capacities ranging from 25,000 to 400,000 btu. For complete information contact your local Westinghouse office or write to Westinghouse Electric Corporation, Air Conditioning Division, Hyde Park, Boston 36, Mass.

YOU CAN BE SURE...IF IT'S Westinghouse

J-80276

TUNE IN ON HISTORY! Only Westinghouse brings you complete coverage of four-month political campaign over CBS television and radio.

The fittings that revolutionized pipe welding . . .

In the year 1931 Taylor Forge gave industry its *first real line* of seamless, butt-welding pipe fittings. We say it was the first *real* line because it was the first to include not only long and short radius ells, but also full branch and reducing tees, concentric and eccentric reducers, stub ends, caps and welding neck flanges.

This was a fully planned development. Many years before Taylor Forge had foreseen the future of the butt-welding fitting . . . had realized that pipe welding could not go beyond its then crude stage until pipe users were given *all* the fittings necessary to make up complete piping systems.

So Taylor Forge went to work on this and after long research and development came out with the full line that became the inspiration of modern pipe welding.

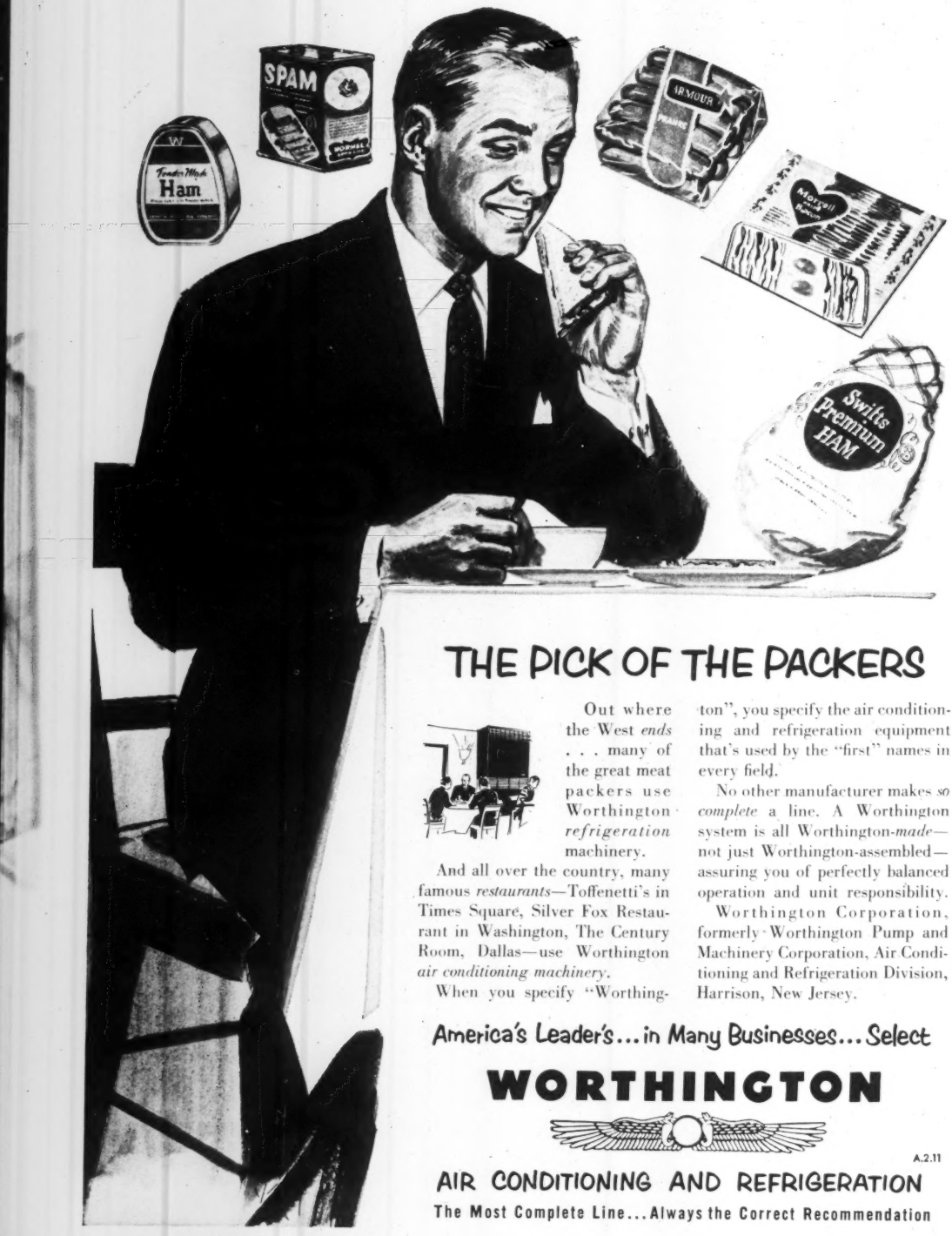
Naturally the organization that started ahead has kept ahead . . . in design, in quality, in breadth of line. That is why so many men who have followed the development of the WeldELL line, refuse to consider any other kind of welding fittings.

TF

For up-to-the-minute facts,
see your Taylor Forge distributor

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS, General Offices and Works: P.O. Box 485, Chicago 90, Ill.
Offices in all principal cities. Plants at: Carnegie, Pa.; Fontana, Calif.; Hamilton, Ont., Canada



THE PICK OF THE PACKERS

Out where the West *ends* . . . many of the great meat packers use Worthington *refrigeration* machinery.

And all over the country, many famous *restaurants*—Toffenetti's in Times Square, Silver Fox Restaurant in Washington, The Century Room, Dallas—use Worthington *air conditioning machinery*.

When you specify "Worthington", you specify the air conditioning and refrigeration equipment that's used by the "first" names in every field.

No other manufacturer makes *so complete* a line. A Worthington system is all Worthington-*made*—not just Worthington-assembled—assuring you of perfectly balanced operation and unit responsibility.

Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Air Conditioning and Refrigeration Division, Harrison, New Jersey.

America's Leader's... in Many Businesses... Select

WORTHINGTON

A.2.11

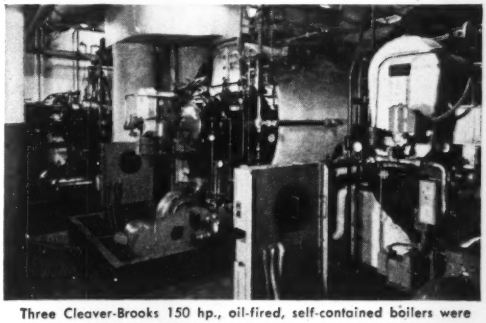
AIR CONDITIONING AND REFRIGERATION

The Most Complete Line... Always the Correct Recommendation

In this modern newspaper building passersby can see running presses through 11 ft. plate glass windows, located directly behind flag pole in this picture.

WASHINGTON POST BUILDING, Washington, D. C. Albert Kahn Associated Architects and Engineers, Inc. John McShain, Inc. — General Contractor. Standard Engineering Company, Engineers and Contractors.

THE WASHINGTON POST'S new 7-story building is heated by a combination of a hot blast ventilating system for the inside areas and convector radiation along the outside walls. The steam distribution system is divided into two sections, one supplying the fan blast coils at 3 lbs. to 5 lbs. pressure and one supplying the radiation at 3 lbs. to 5 lbs. pressure.



Three Cleaver-Brooks 150 hp., oil-fired, self-contained boilers were easily and quickly installed in low headroom, basement space.

Three Cleaver-Brooks 150 hp. oil-fired, self-contained boilers, installed in the basement location, supply steam for the entire heating system.

Modern Cleaver-Brooks boilers are increasingly specified for heating service. Completely self-contained and compact in design, requiring minimum headroom and floor area, Cleaver-Brooks boilers offer many installation and operating advantages — oil, gas, or combination oil and gas firing — fully automatic — clean — dependable performance — operate at a guaranteed efficiency of 80%. Available in sizes from 15 to 500 hp., 15 to 250 psi.

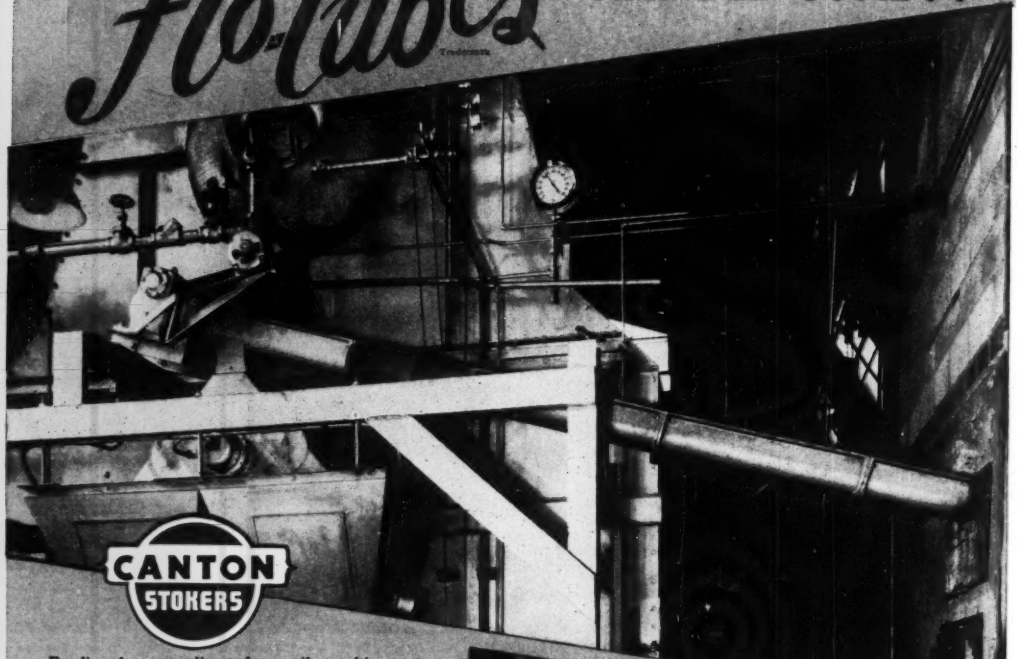
Write for the latest, fully illustrated Steam Boiler Catalog — Cleaver-Brooks Company, Dept. K 312 East Keefe Avenue, Milwaukee 12, Wisconsin, U.S.A. *Cable address*: CLEBRO-Milwaukeewis.

Cleaver-Brooks
Originators of Self-Contained
STEAM BOILERS

Oil and Bitumen Tank-Car Heaters • Distillation Equipment • Oil and Gas-Fired Conversion Burners

CANTON *Flo-tubes* Trademark

MODERN WAY TO HANDLE COAL . .



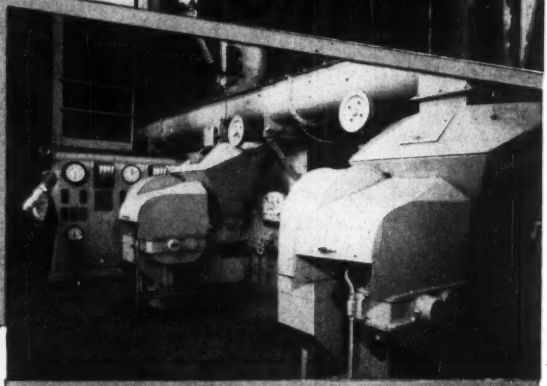
CANTON STOKERS

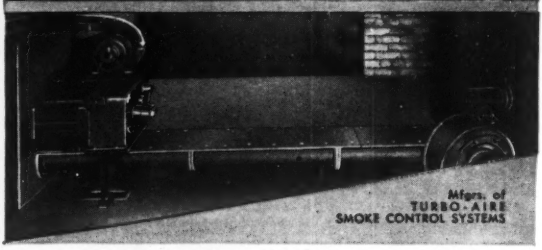
Feeding hoppers direct from pile or bin saves real money in time and man power . . . frees men for other duties, allows more efficient use of labor. Canton Flo-Tube installation above feeds from coal bin at right. Chute dividers are hand adjustable, hopper levels diaphragm controlled.

RIGHT photo—a horizontal application, using gate valves.

LOWER right photo—a reversed binfeed installation entering rear of boiler.

Canton Stoker Corporation — specialists in COAL FIRING, HANDLING, and CONTROL EQUIPMENT — invites you to contact their representatives in principal cities, or write direct.





Mfgrs. of TURBO-AIRE SMOKE CONTROL SYSTEMS

CANTON STOKER CORPORATION

2400 Andrew Place S. W. CANTON, OHIO

☐ Send literature on: _____

_____

☐ Have a Canton Engineer interview us.

Name: _____

Company: _____

Address: _____

City: _____ State: _____

A Highly Efficient Blanket Insulation

. . . for effective control of temperature and sound

If you have a heating, refrigerating or air conditioning application that calls for an insulation with the most effective thermal-acoustical qualities, you might well ask these questions about Microlite Glass Fiber Insulating Wool:

Is it easy to apply? . . . *24 square feet of half-inch, half-pound Microlite weighs a mere 8 ounces. Large sections can be quickly and easily applied, like a downy blanket. Knife or shears are the only necessary cutting tools.*

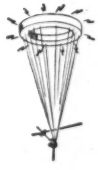
Is it permanent? . . . *Microlite is made of glass fibers that resist fire, corrosion, moisture and vibration settling. It does not decay and provides no nutriment for fungi or vermin.*

Does it insulate well? . . . *Inch for inch, Microlite is one of the most efficient of all insulations. 1 lb. density material has a "k" factor of .21 at 75° F. mean temperature.*

Are convenient sizes and types available? . . . *It comes to you in resilient blankets up to 72 inches wide, up to 200 feet long, and up to 3 inches thick; compressed in easily-stored rolls. It may be ordered with foil, reflective coated paper and reinforced or unreinforced paper vapor barriers.*

Perhaps Microlite can help you cut installation costs and achieve a lighter finished application. For more information and samples, write Glass Fibers Inc., 1810 Madison Avenue, Toledo 2, Ohio.

A Vitrow® GLASS FIBER PRODUCT



Sales Offices and Distributors in Principal Cities

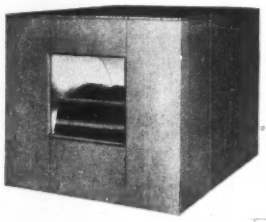
GLASS FIBERS INC.

Makers of glass fibers by the ELECTRONIC-EXTRUSION process . . . developed, patented and used exclusively by Glass Fibers Inc.

Comfort Air Washer

FOR EVERY COOLING•NEED

a Better Product doing a Better Cooling Job



4 practical sizes built to deliver full-rated capacity of triple-washed, cool, filtered, fresh air per minute, all season long.

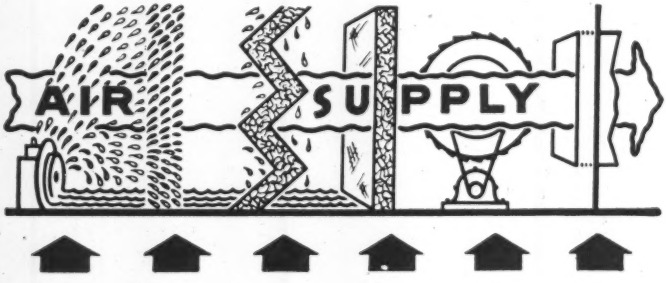
Model	CFM	Motor	
35 AW	3500	½ h.p.	Spray-wheel motors
50 AW	5000	1 h.p.	for all models, ⅓
75 AW	7500	2 h.p.	h.p.—single or
100 AW	10,000	3 h.p.	three-phase

These Better Basic Features Distinguish the AIR WASHER

- All incoming air washed of dust and dirt, filter pads remain unclogged . . . cooling efficiency stays high and uniform.
- Comfort Spray-Wheel provides coninuous sheet of mist and heavy water over pad surfaces. No pumps, no spray nozzles . . . trouble-free.
- MORE PAD AREA (stair-stepped in design) permits lower velocities, lower resistance and higher efficiency.
- FIBERGLAS (Reg.) PADS throughout — vegetable and fungi odors eliminated.
- Non-splash louvres eliminate back-splashing of water.
- Rust-proof construction, durable, attractive hammer-enamel finish outside.
- Self-aligning graphite bronze pillow blocks, wool felt, packed deep to provide long, trouble-free Air Washer Service.

Comfort Air Washer . . . *THE COOLING UNIT THAT MEANS PROFIT FOR YOU*

Diagramatically here's the way the Comfort Air Washer works—



Comfort-Engineered, non-clogging spray-wheel atomizes water for proper washing of air

Continuous wall of atomized water filters, cleans, and completely drenches

Stair-step FIBERGLAS (Reg.) filter unit supports no organic growth

Baffle filter for humidity control

Properly sized HEAVY-DUTY BLOWER (cog-belt driven). Full-size motor maintains full-rated air supply

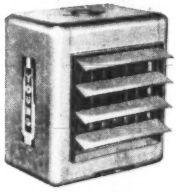
Adequate static pressure available at blower outlet for duct systems

For further information write to . . .

COMFORT PRODUCTS CORP.
2220 LAMESA • DALLAS, TEXAS

IT'S EASY TO SELL C-O-M-F-O-R-T

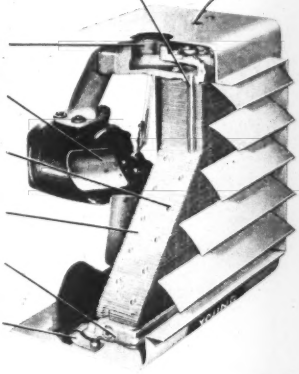
If You Install Unit Heaters You'll Want These Features



Horizontal Type Unit Heaters are available in 14 sizes . . . for hot water or steam systems up to 150 lbs. pressure.

Large tubes rolled into headers and reinforced by ferrules.

Header tapped for suspending Unit Heater independently of piping.



Full size supply, return tappings.

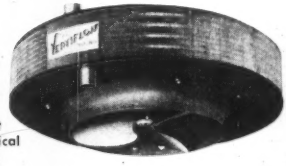
Fan delivers maximum air, runs quietly.

Fins are mechanically bonded to tubes.

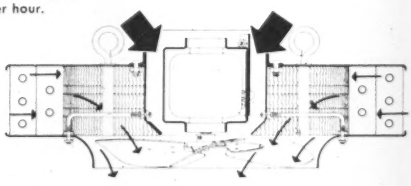
Non-ferrous, tube-and-fin type heating element.

One-piece, cast iron, close-grain headers.

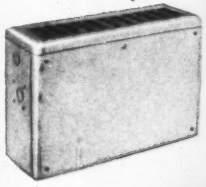
Spring mounted for expansion and contraction of heating unit.



"Vertiflow" Unit Heaters for vertical air discharge in capacities from 52,600 to 552,000 Btu per hour.

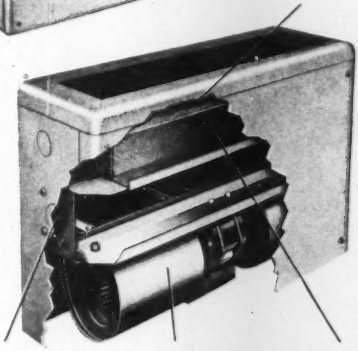


"Vertiflow" Unit Heaters, designed to deliver an abundance of heat from unusually high ceilings, have circular, non-ferrous heating element and patented motor ventilation feature which prevents motor "baking." When fan is in operation, cooler room air is drawn downward through ventilating stack around motor (see large arrows in cut-away view), keeping it cool. When motor is off, radiant heat from core rises, and draws cooler room air through ventilating stack in reverse direction. Diffusers are available.



Cabinet Unit Heaters, available in three basic styles for steam or hot water systems, are used in auditoriums, lobbies, recreation halls, etc.

Non-ferrous, tube-and-fin heating element.



Knockouts simplify piping and pitching in horizontal or vertical installations.

Removable blower assembly unit . . . resiliently mounted quiet motor.

Core can be pitched either direction and air vented . . . for hot water systems.

● Young Unit Heaters—Horizontal, Vertical and Cabinet types—provide an abundance of heat where you want it, when you want it. They are designed for use with steam or hot water systems, and are available in many models covering a range of heating capacities. The types shown above incorporate design features that have been proven through a quarter century of satisfactory performance and customer acceptance. They are engineered for specialized as well as routine applications to meet all large capacity heating requirements. For further details write for illustrated catalogs Nos. 2548, 2648, 6548.

1927 • 1952
25 YEARS OF PROGRESS IN HEAT TRANSFER ENGINEERING

YOUNG

Heating, Cooling, Air Conditioning Products for Home and Industry.

Heat Transfer Products for Automotive and Industrial Applications.

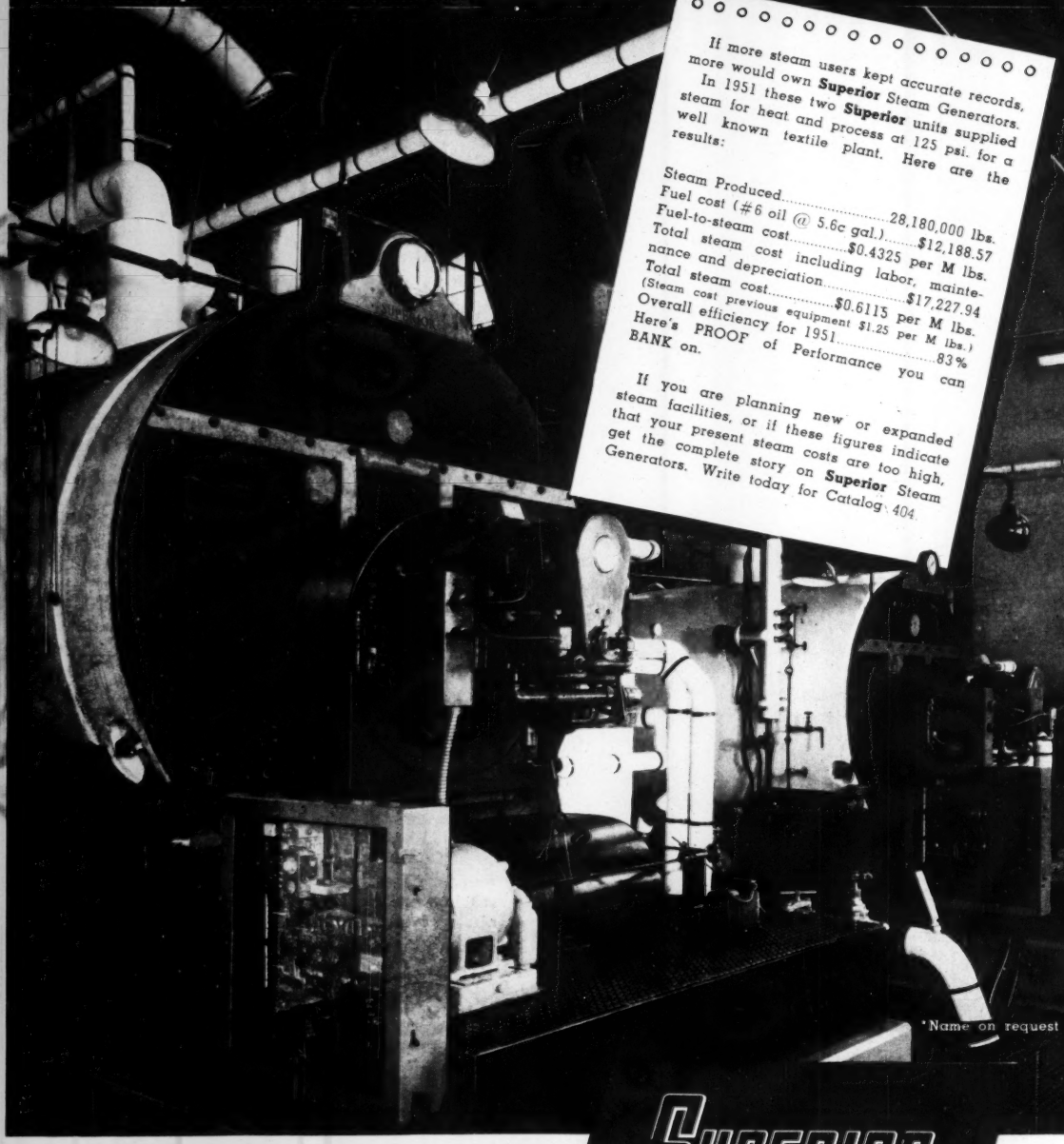
YOUNG RADIATOR COMPANY

Dept. 512J ● RACINE, WISCONSIN
Factories at Racine, Wisconsin and Mattoon, Illinois
Sales and Engineering Offices in all Principal Cities

accept no of economy

LOOK at these STEAM COSTS

from a prominent Rhode Island Textile Manufacturer *



If more steam users kept accurate records, more would own **Superior** Steam Generators. In 1951 these two **Superior** units supplied steam for heat and process at 125 psi. for a well known textile plant. Here are the results:

Steam Produced	28,180,000 lbs.
Fuel cost (#6 oil @ 5.6c gal.)	$12,188.57
Fuel-to-steam cost	$0.4325 per M lbs.
Total steam cost including labor, maintenance and depreciation	$17,227.94
Total steam cost (Steam cost previous equipment $1.25 per M lbs.)	$0.6115 per M lbs.
Overall efficiency for 1951	83%

Here's PROOF of Performance you can BANK on.

If you are planning new or expanded steam facilities, or if these figures indicate that your present steam costs are too high, get the complete story on **Superior** Steam Generators. Write today for Catalog 404.

*Name on request

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 18, N.Y.

SUPERIOR
STEAM GENERATORS

IF YOU USE ALLOY PIPING...

This New Bulletin Will Show You How KEY-KAST ALLOY WELDING FITTINGS Can Add Longer Life to Your Alloy Piping System—at Lower Cost. Send for Your Copy Today!

KEY-KAST ALLOY WELDING FITTINGS OFFER *ALL* THESE ADVANTAGES TO YOUR PIPING SYSTEM:

Greater wall thickness throughout—for increased structural strength.

Extra thickness in critical areas—for greater allowance against corrosion and erosion.

Lower unit cost.

Meets A.S.M.E., A.S.T.M., and A.S.A. codes.

Bosses provided on all fittings for tapped openings.

Controlled quality . . . through rigid metallurgical control—produced, inspected and tested in one plant.

AVAILABLE IN ALL SHAPES . . . SIZES . . . SCHEDULES . . . IN LOW AND INTERMEDIATE ALLOYS AND VARIOUS STAINLESS STEELS

Key company

Since 1916 . . . manufacturers and developers of products for high temperatures and pressure.

P. O. BOX 494-G
EAST ST. LOUIS, ILLINOIS

DISTRICT OFFICES: NEW YORK • CLEVELAND CHICAGO • TULSA • HOUSTON • LOS ANGELES

Mail this coupon today!

KEY COMPANY
P. O. Box 494-G East St. Louis, Illinois
Please send me your new Key-Kast Alloy Welding Fitting Bulletin.

Name.....
Company.....
Position.....
Address.....
City.....Zone....State.....

We go to any lengths for Dependability

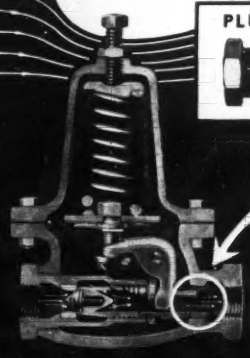
This man deserves the best!

In homes and factories wherever Wheatland steel pipe is used there goes behind it the reputation of the well-experienced men who supervise the making of "the pipe with the yearmark". From the moment it enters the charging furnace until the time it is tested under pressure, no stone is left unturned to insure delivery of quality steel pipe to you.

-pipe with the yearmark!

WHEATLAND
TUBE COMPANY
Bankers Securities Building, Juniper & Walnut Sts., Philadelphia 7, Pennsylvania

THIS FLOW PATTERN



PLUS the FLOW TUBE for straightline flow

PLUS the ASPIRATOR which gets the inner valve open wide for peak demand

ARE ALL COMBINED IN THE

CASH STANDARD TYPE 1000 PRESSURE *Streamlined* **REDUCING VALVE**

to materially cut your valve performance costs

☆

Benefits

- Maximum Capacity when needed most
- Accurate Pressure Control under toughest working conditions
- Trouble-free Service
- Smooth Operation
- Tight Closure
- Accurate Regulation
- Speedier Production Results
- Elimination of Failures
- Constant Delivery Pressure
- Cost Saving Operation
- No Spoilage
- Practically zero in maintenance costs

★

With these three features—all in one valve, you are getting Valve performance that gives you cost saving benefits that begin with the installation and last for years.

☆

First, the streamlined flow around the inner valve; then the straight path for the fluid through the flow tube; then the aspirator which turns small pressure changes into large valve operating forces. These things have made the Streamliner click.

☆

Bulletin 962 features the CASH STANDARD Streamlined Type 1000 Pressure Reducing Valve—illustrates the streamlined construction and tells why you get exceptionally long, trouble-free, low-cost performance. Points out why you get no turbulence and therefore can meet peak demand at all times. Explains why straightline flow gives you maximum capacity, close delivery pressure control, and tight closure.

CASH STANDARD CONTROLS.. VALVES

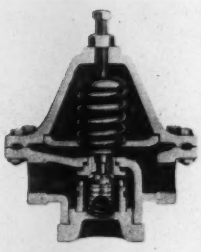
A. W. CASH COMPANY
DECATUR, ILLINOIS

•

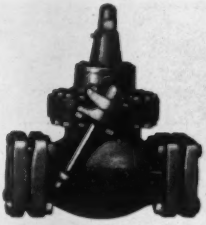
BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES

Send for them

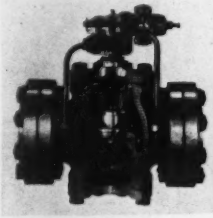
•



Bulletin 950—features the CASH STANDARD Type D Single Seat Pressure Reducing and Regulating Valves for use with most fluids. Shows simple inner working parts that save in maintenance. Diagram explains how valve works. Blueprint shows simplicity of installation.

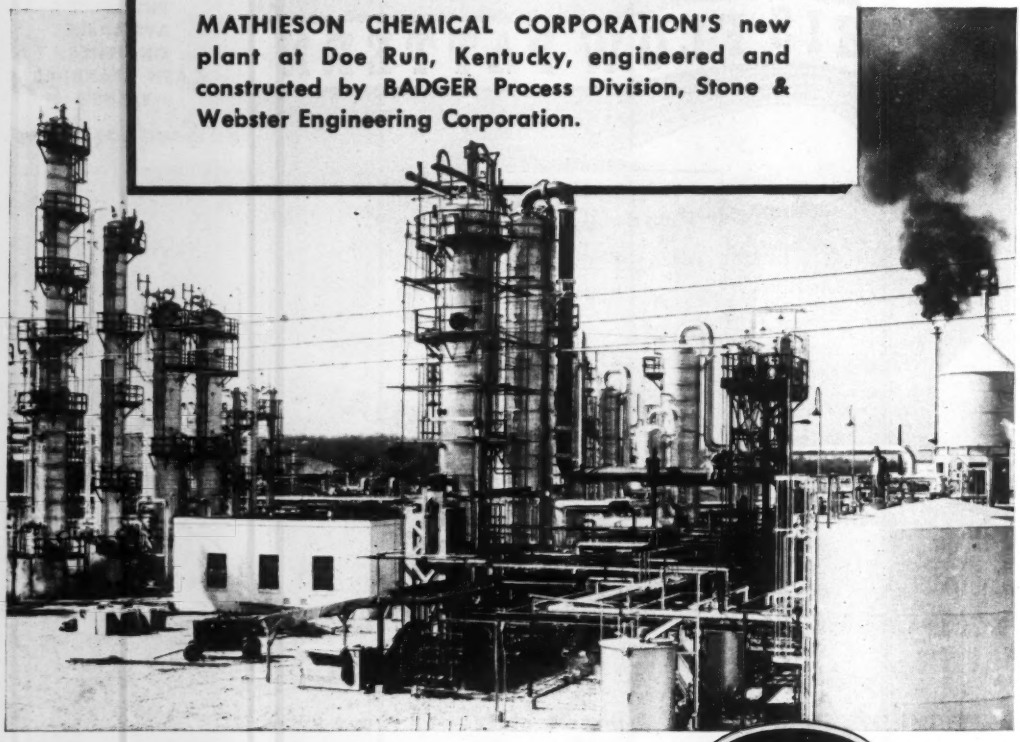


Bulletin 956—features the CASH STANDARD Type 4030 Back Pressure Valve — designed to automatically maintain a constant pressure in the evaporator corresponding to a constant temperature desired. Shows an Ammonia and Freon Gas Capacity Chart based on ABSOLUTE pressures.



Bulletin 966—features the CASH STANDARD Self-Contained, Pilot Operated Type 10 Pressure Reducing and Regulating Valve for use with water or air; with any gas or oil that is non-corrosive; and with refrigerating fluids such as Ammonia and Freon. Many interesting particulars explained such as: how valve works, tight seating, large capacity, no waste, no water hammer or chatter.

MATHIESON CHEMICAL CORPORATION'S new plant at Doe Run, Kentucky, engineered and constructed by BADGER Process Division, Stone & Webster Engineering Corporation.



...and using the OIC

LONG LINE OF VALVES

OIC builds valves for every purpose—cast and forged steel, iron and bronze—and every valve is *precision-engineered* and *precision-made* to give longer, trouble-free service at no extra cost to you. OIC offers *precision-application* help in selecting valves best suited to each job.

THE OHIO INJECTOR COMPANY
WADSWORTH, OHIO

OIC
FOUNDED 1883

VALVES

FORGED AND CAST STEEL • IRON • BRONZE

TWIN OAKS APARTMENTS
Kansas City, Missouri
VOSKAMP and SLEZAK, Architects
6 mechanically fired Type "C" Kewanees
(10 million Btu) installed by
A. D. JACOBSON PLUMBING & HEATING CO., Inc.

"PEAK PERFORMANCE FROM THE BOILER ROOMS"

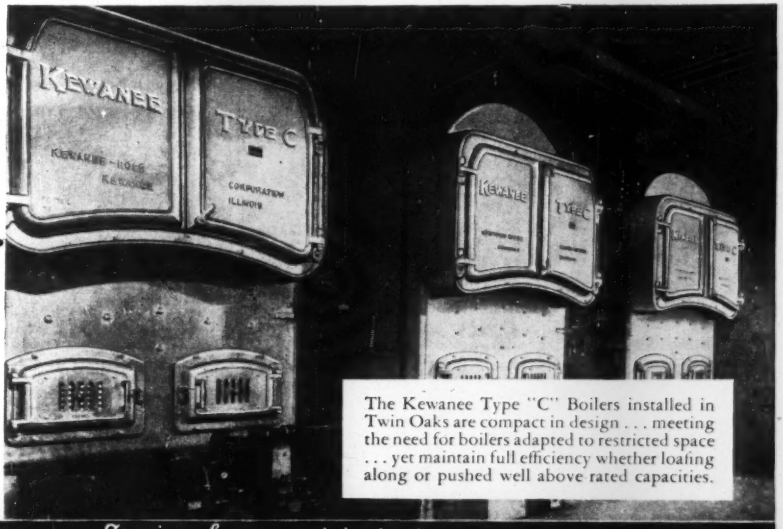
with

KEWANEE
STEEL BOILERS

The TWIN OAKS APARTMENTS in Kansas City consist of two buildings housing 618 families, each building having its own boiler room equipped with a battery of 3 Kewanee Type "C" Boilers. In commenting on this installation the A. D. Jacobson Plumbing & Heating Company says:

"Although this is not an elaborate installation it was designed strictly for efficiency with a minimum of maintenance and so far the boiler rooms have delivered peak performance."

KEWANEE-ROSS CORPORATION
Division of American Radiator & Standard Sanitary Corporation
KEWANEE, ILLINOIS

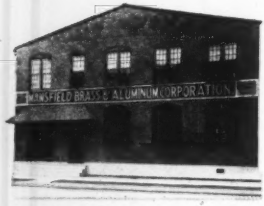


The Kewanee Type "C" Boilers installed in Twin Oaks are compact in design . . . meeting the need for boilers adapted to restricted space . . . yet maintain full efficiency whether loafing along or pushed well above rated capacities.

KEWANEE-ROSS PRODUCTS

Serving home and industry

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON



Mansfield Brass and Aluminum Corp.
Mansfield, Ohio

HEATING CONTRACTOR
ALLEN KNAPP HEATING COMPANY
MANSFIELD, OHIO

NO COLD FLOORS HERE

UNIT HEATER USED FOR CENTRAL HEATING SYSTEM

This two floor building with manufacturing on the first floor and office and storage space on the second offers a typical heating problem.

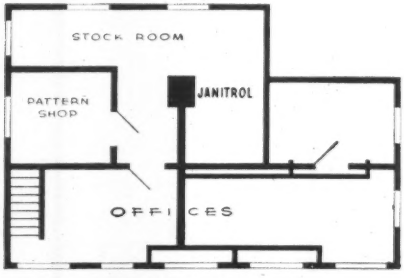
While unit heaters give satisfactory heating spotted throughout the open factory area, the second floor is cut up into separate rooms.

A single Janitrol Unit Heater suspended from the ceiling of the stockroom is connected to an extended plenum carrying warm air to the front of the building with separate ducts descending along outside walls to deliver heat to floor level.

For the smaller private offices it was more practical to use high wall diffuser type registers. Executives and office employees are completely satisfied with their office comfort after a full heating season experience.

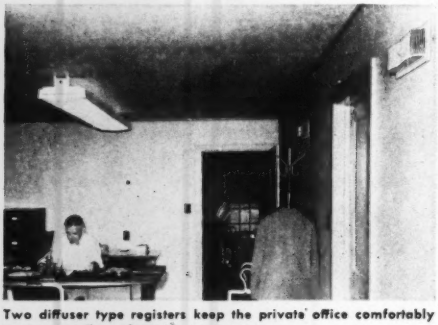
This is an example of the versatility of Janitrol Unit Heater installations in all types of industrial and commercial building.

Write for more complete installation data.

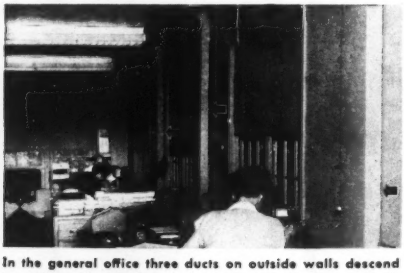


SECOND FLOOR PLAN

This 175,000 Btu Unit, blower equipped uses no floor space. Operation is quiet and completely automatic.



Two diffuser type registers keep the private office comfortably warm regardless of outside temperatures.



In the general office three ducts on outside walls descend to within a few inches of the floor, introducing warm air where most needed.

®Janitrol Gas-Fired Unit Heaters

SURFACE COMBUSTION CORPORATION • TOLEDO, OHIO

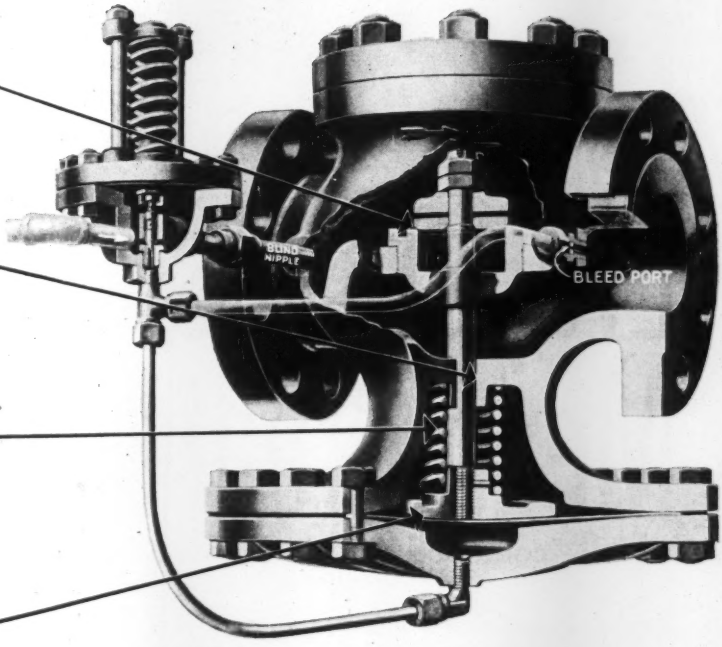
WHY Spence Regulators Outlast The Field

SECO METAL SEATS AND DISCS — Durable SECO Metal resists wiredrawing. More than *twenty years of experience* in thousands of installations has failed to produce a single case where SECO Metal has been cut by steam.

PACKLESS CONSTRUCTION — All Spence main valves and most pilots are built without stuffing boxes. This minimizes friction . . . eliminates much time-consuming maintenance.

SPRING OUT OF PATH OF STEAM — The spring in the Spence Regulator is out of the path of the steam or other fluid flowing through the valve. It operates at low unit stress for exceptionally long life.

LARGE BALANCED DIAPHRAGM—Spence metal diaphragms, under usual conditions, never require replacement. Spence Regulators have few moving parts and those few are ruggedly constructed and seldom require attention.



Spence Type EQ back pressure regulator — operation of main valve is controlled by a sensitive pilot to regulate the initial pressure. Same pilot is used with all sizes of main valves.

The features shown above explain why you profit on every important count with Spence Pressure and Temperature Regulators.

Learn more about these and many other advantages of Spence Regulators by sending for Bulletin 350.

DURABILITY — Spence Regulators perform dependably year after year.

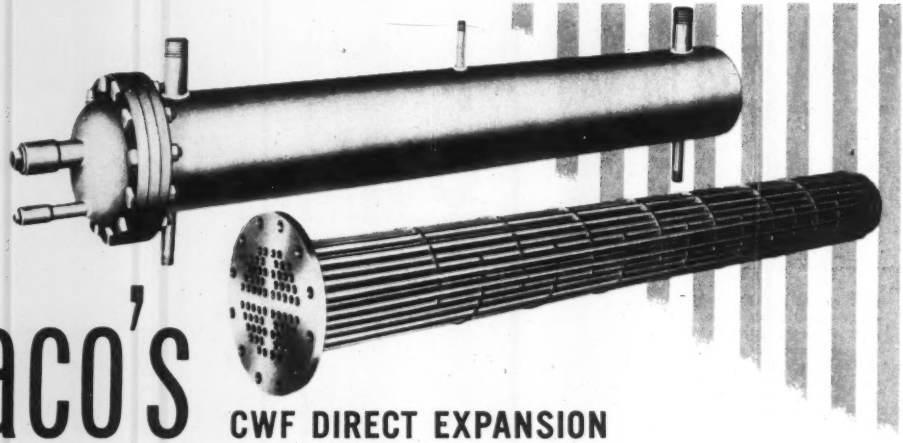
ACCURACY — You can be sure of accurate control for the life of the regulator.

MAINTENANCE — You don't need expensive repairs or special maintenance. That means less down-time, less time and money wasted on replacement of parts.

SE-110

SPENCE ENGINEERING COMPANY, INC.
WALDEN, NEW YORK

Spence



Taco's CWF DIRECT EXPANSION Evaporators (FOR LIQUID CHILLING OR WATER COOLING) Mean Greater Profits

FOR AIR CONDITIONING AND REFRIGERATION CONTRACTORS

Quality Construction and Better Design Give Long Life, Maintenance-Free, Low Cost Operation

TACO HEATERS, Incorporated, since 1920, has backed heating and air conditioning contractors with the highest quality heat exchangers, such as those illustrated in this ad: water heaters and coolers, fuel oil heaters, condensers, instantaneous water heaters, converters and tank heating units.

Now, Taco has increased its production facilities to match the air conditioning and refrigeration industry's growth. Taco's "know how" in large heat exchanger design and installation is at the service of all its friends in the industry.

Better Heating-Better with Taco

Taco

TACO HEATERS, INCORPORATED • 137 SOUTH STREET, PROVIDENCE 3, R. I.

TACO MAKES A WIDE LINE OF SHELL & TUBE HEAT EXCHANGERS
4 of which are shown below

"WW" Series Water Heaters

"WS" Series Water Heaters

"TU" Series Tank Heating Units

Straight Tube Heat Exchangers

Another

SEALMASTER First... ZONE HARDENING*

SEALMASTER first introduced the self-aligning, permanently-sealed, industrial ball bearing unit... the outer race locking pin... the ball retainer riding the inner surface of the outer race ring—all patented features of SEALMASTER Ball Bearing Units. NOW... SEALMASTER INTRODUCES ANOTHER MAJOR ADVANCEMENT—*ZONE HARDENING.*

ZONE HARDENING hardens the ball path section of the inner race ring by induction heating (See 1 in cutaway view). The extended part of the inner race is left in its original, metallurgically soft state. The hardened set screws are mounted through the soft part of the extended race (See 2 and 3), permitting race-to-shaft locking with increased holding power and greater resistance to shock and vibration. Firm lock of bearing to shaft minimizes danger of fretting corrosion and eliminates shaft wear.

OTHER SEALMASTER *FIRSTS*

PERMANENTLY SEALED, SELF-ALIGNING BALL BEARING
... has felt-lined steel flingers rotating in labyrinth to prevent entry of dirt and to retain proper amount of lubricant (see 4).

LOCKING PIN AND PERIMETER DIMPLE
... prevents bearing from spinning in its housing and prevents fretting corrosion between housing and bearing, yet permits sufficient shaft alignment without seal distortion (See 5 and 6).

BALL RETAINER
... rides on the ground inner surface of the outer race ring (See 7), eliminates ball wear, trapping grease and preventing its churning in the bearing.

SEALMASTER Units are available in many special housings as well as in the complete standard line. Write us for full details on special units. Ask for a copy of SEALMASTER Catalog 845.

*Patented—exclusively SealMaster's

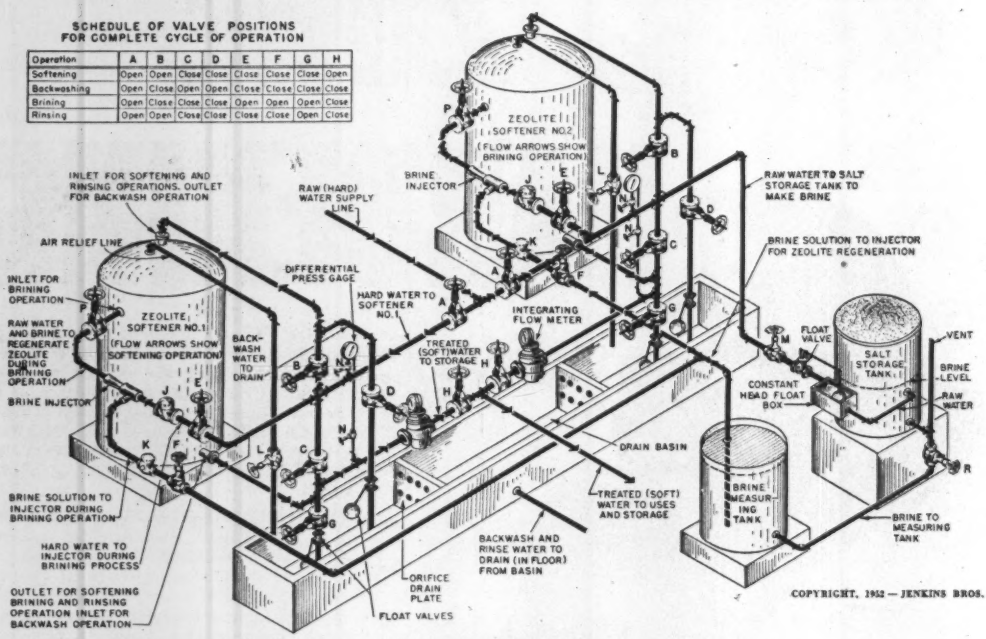
SEALMASTER BEARINGS
47 RIDGEWAY AVENUE, AURORA, ILLINOIS
A DIVISION OF STEPHENS-ADAMSON MFG. CO.

FACTORY REPRESENTATIVES AND DEALERS IN ALL PRINCIPAL CITIES

JENKINS PRACTICAL PIPING LAYOUTS 62

SCHEDULE OF VALVE POSITIONS FOR COMPLETE CYCLE OF OPERATION

Operation	A	B	C	D	E	F	G	H
Softening	Open	Open	Close	Close	Close	Close	Close	Open
Backwashing	Open	Close	Open	Open	Close	Close	Close	Close
Brining	Open	Close	Close	Close	Open	Open	Open	Close
Rinsing	Open	Open	Close	Close	Close	Close	Open	Close


ZEOLITE SOFTENER NO.2 (FLOW ARROWS SHOW BRINING OPERATION)
INLET FOR SOFTENING AND RINSING OPERATIONS. OUTLET FOR BACKWASH OPERATION
BRINE INJECTOR
RAW (HARD) WATER SUPPLY LINE
RAW WATER TO SALT STORAGE TANK TO MAKE BRINE
AIR RELIEF LINE
BRINE SOLUTION TO INJECTOR FOR ZEOLITE REGENERATION
INLET FOR BRINING OPERATION
DIFFERENTIAL PRESS GAGE
HARD WATER TO SOFTENER NO.1
INTEGRATING FLOW METER
FLOAT VALVE
VENT
SALT STORAGE TANK
BRINE LEVEL
RAW WATER
RAW WATER AND BRINE TO REGENERATE ZEOLITE DURING BRINING OPERATION
ZEOLITE SOFTENER NO.1 (FLOW ARROWS SHOW SOFTENING OPERATION)
BACK-WASH WATER TO DRAIN
TREATED (SOFT) WATER TO STORAGE
CONSTANT HEAD FLOAT BOX
BRINE INJECTOR
DRAIN BASIN
BRINE MEASURING TANK
TREATED (SOFT) WATER TO USES AND STORAGE
BRINE SOLUTION TO INJECTOR DURING BRINING OPERATION
BRINE TO MEASURING TANK
HARD WATER TO INJECTOR DURING BRINING PROCESS
BACKWASH AND RINSE WATER TO DRAIN (IN FLOOR) FROM BASIN
ORIFICE DRAIN PLATE
OUTLET FOR SOFTENING BRINING AND RINSING OPERATION INLET FOR BACKWASH OPERATION
FLOAT VALVES

COPYRIGHT, 1952 — JENKINS BROS.

Diagram by Huxley Madeheim
Consulting Engineer

VALVE RECOMMENDATIONS
For details of valves to suit varying conditions, see Jenkins Catalog

Code	Quan.	JENKINS VALVES	SERVICE
A	2	Fig. 651 I.B.B.M. Gate or Fig. 100 All Iron Gate	Raw Water Supply to Softener
B	2	Fig. 651 I.B.B.M. Gate or Fig. 100 All Iron Gate	Control of Cycle Operations
C	2	Fig. 651 I.B.B.M. Gate or Fig. 100 All Iron Gate	Control of Cycle Operations
D	2	Fig. 651 I.B.B.M. Gate or Fig. 100 All Iron Gate	Backwash Drain Line
E	2	Fig. 100 All Iron Gate	Injector Water Shutoff
F	2	Fig. 40-A All Iron Gate	Brine Control to Injector
G	2	Fig. 651 I.B.B.M. Gate	Brine and Rinsing Operation Drain
H	2	Fig. 651 I.B.B.M. Gate	Softened Water Shutoff
J	2	Fig. 624 I.B. Swing Check or Fig. 85 All Iron Swing Gate	Prevent Backflow
K	2	Fig. 623 I.B. Swing Check or Fig. 85 All Iron Swing Gate	Prevent Backflow
L	2	Fig. 106-A Bronze Globe	Air Release
M	1	Fig. 106-A Bronze Globe	Water Supply for Brine
N	4	Fig. 743-G Bronze Needle	Pressure Gage Control
P	2	Fig. 100 All Iron Gate	Brine Connection Shutoff at Softener
R	1	Fig. 40-A All Iron Gate	Brine to Measuring Tank

How to plan a ZEOLITE (BASE EXCHANGE) WATER SOFTENING SYSTEM

Diagram shows piping connections for a zeolite water softening system (removal of hard water impurities). Twin softening units permit one to operate while the other is being regenerated, (replacing used sodium in the zeolite).

The complete cycle consists of softening, backwashing, brining, and rinsing. After a certain amount of raw water has been softened, the sodium in the zeolite is used up. The process is then stopped by operating the valves as indicated in the schedule, and the other softening unit is put into operation.

The zeolite is regenerated, after the backwash operation (first step in regeneration of softener), by replacing accumulated calcium and magnesium with the sodium by running through a brine solution. The zeolite is then rinsed after correct amount of brine solution has been admitted.

The rinsing operation also removes any remaining brine, making the softener ready for re-use when needed. Depending upon the chemical composition of the water, either iron-body bronze-mounted or all-iron valves are recommended on all lines conducting the water before it is completely treated.

Consultation with piping engineers is recommended when planning any major piping installations.

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering, select all the valves you need from Jenkins complete line. It's your best assurance of *lowest cost in the long run.* Jenkins Bros., 100 Park Ave., New York 17.

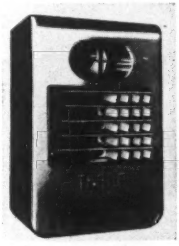
Complete description and enlarged diagram of this layout free on request. Includes additional detailed information. Simply ask for Piping Layout No. 62.

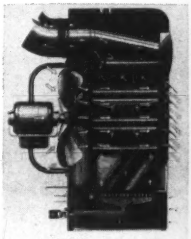
JENKINS
LOOK FOR THE DIAMOND MARK
VALVES
SINCE 1864
JENKINS MARK

EQUIPMENT DEVELOPMENTS...

Gas Fired Unit Heaters

HPAC 1—Gas fired unit heaters in six sizes ranging in capacity from 50,000 to 230,000 Btu per hr input. The heat exchanger features horizontal steel tubes staggered to provide maximum areas of prime heat surface, the manufacturer states. The tubes are rolled into heavy end sheets, boiler tube style, and fortified with additional outer and inner rolled flanges. The heat generator in-

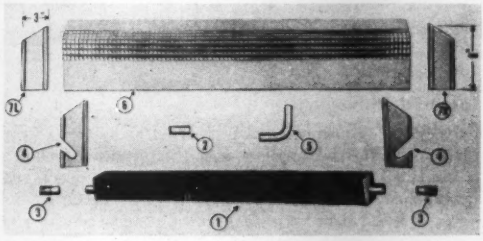




cludes burner heads and mixing tubes of one-piece cast iron construction. They are engineered for combustion of natural, manufactured, mixed, or liquid petroleum gas. Burners, pilot, and control valves are combined in one removable drawer type assembly. Built-in safety controls include a switch to prevent overheating. Curved louvers direct heated air, which accumulates at the ceiling, back down to the worker comfort zone. [Manufacturer: The Trane Co., La Crosse, Wis.]

Convector for Baseboard Radiation

HPAC 2*—New type "knock-down" convector for baseboard radiation, designed to eliminate the need for taking close measurements and ordering specific sizes. All the fitting and cutting can be done on the job. Part No. 1 (shown) consists of a copper tube convector with aluminum fins expanded onto the tube. Available in 10 ft lengths, it can be cut on the job to the desired length or two or more lengths may be joined. For rapid installation, wall mounting brackets (No. 4 shown) are furnished, to be spaced on 54 in. centers. After the mounting of the wall bracket, cutting of the convector to length, and soldering of copper sleeves (No. 2) and spuds (No. 3), the convector is slipped into the slots provided in the wall brackets, connections being made to supply and return. Part No. 5 is copper bend for joining convectors



on corner installations. Formed steel cover (No. 6) is available in 10 ft lengths. End pieces 7L (left) and 7R (right) are used where the convector does not end at a wall. EDR capacity is 4.50 sq ft per lineal ft at 1 lb steam pressure with air at average temperature of 70 F. The convector can be used for either steam or hot water. [Manufacturer: Rempe Co., 340 N. Sacramento Blvd., Chicago 12.]

Pillow Blocks

HPAC 3—All-steel pillow blocks designed to provide high load carrying capacity in a compact passage. High radial and thrust capacities have been provided for within minimum dimensions and with less weight, the manufacturer states. The bearings are self-aligning, with spherical outer race. They are available in both expansion and non-expansion types. Double piston ring seals protect the

For your convenience in obtaining more information about any of this equipment, use this coupon. Add the new products and companies listed here to your Directory Section which you received in your January 1952 Heating, Piping & Air Conditioning, and thus keep your records of sources of supply up to date throughout the year. Single asterisk indicates equipment not listed in Directory Section; double asterisk, equipment and manufacturer not listed.

Heating, Piping & Air Conditioning
6 N. Michigan Ave., Chicago 2, Ill. **[9-52]**

Please ask the manufacturers to send me more information about the equipment mentioned under these reference numbers in Equipment Developments and Recent Trade Literature

(Circle each HPAC number in which you are interested)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53							
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115
116	117	118	119	120	121	122	123	124	125	126	127	128		130
131	132	133	134	135	136	137	138	139	140	141	142	143	144	145
146	147	148												

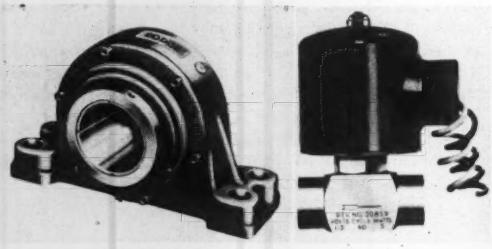
Name ..... **Title** .....

Company .....

Address .....

City ..... **Zone** ..... **State** .....

bearing mechanisms, and bearings are sealed both on and off the shaft. They will be provided in shaft sizes from $2\frac{15}{16}$ in. to 10 in. The pillow blocks are shipped ready to install. [Manufacturer: Dodge Mfg. Corp., 500 S. Union St., Mishawaka, Ind., in collaboration with the Timken Roller Bearing Co., Canton, Ohio.]



Pillow Block

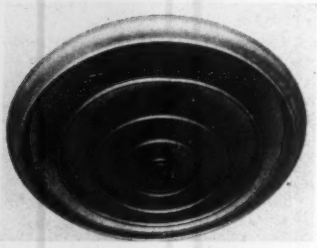
Valve

Solenoid Valve

HPAC 4*—Solenoid valve (Model 67) for a wide range of industrial applications. For positive sealoff, it is furnished with a synthetic resilient disk-type needle seating against a stainless steel orifice. For other applications, it is furnished with a stainless steel needle in combination with a corrosion-resistant stainless steel valve seat. According to the manufacturer, the design prevents "ovaling" and wire-drawing of the seat, even after long periods of continuous operation. Available in two body styles, $\frac{3}{8}$ in. female pipe or $\frac{1}{2}$ in. OD tube sweat connections, the valve can be used for air, oil, water, gasoline, alcohol, detergents, refrigerants, propane, or other noncorrosive liquids and gases. Capacity on water is 78 gph and on refrigerant applications, 1 ton "Freon-12". Working pressure is up to 300 psi. Operating differential is: liquid lift up to 130 psi, air and gases 250 psi, refrigerants 200 psi. [Manufacturer: A-P Controls Corp., 2460 N. 32nd St., Milwaukee 10.]

Ceiling Air Diffuser

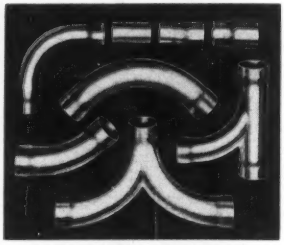
HPAC 5**—Ceiling air diffuser (Model BR), featuring an adjustable cone assembly which can be removed from the ceiling plate without use of tools, for installation and inspection. Diffusers are available in a range of sizes



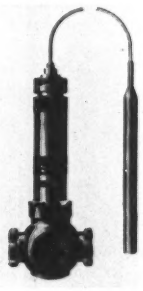
from 6 through 32 in. Adjustment for all air patterns from horizontal to vertical is made by turning the center plate, which raises or lowers the cones. [Manufacturer: W. R. Carnes Co., S. Main St., Verona, Wis.]

Tubing and Fittings for Vacuum Cleaning

HPAC 6**—"Vacuflo" welded steel tubing and fittings, in standard sizes, for use in industrial, commercial, educational and institutional vacuum cleaning systems. Tubes are inserted in the flanged ends of the fittings, and joints are sealed on the job by brazing or welding; various types of mastic also can be used. The equipment offers greater volume of carrying capacity, and eliminates "deadhead pockets" in T's and TY's, which allow dirt to collect, the manufacturer states. The directional design is intended to make it impossible to install any of the fittings backward. The fittings are offered in 2, $2\frac{1}{2}$, and 3 in. stock sizes, with special larger sizes also available. [Manufacturer: H-P Products, Inc., Louisville, Ohio.]



Above: Tubing and Fittings



Right: Regulator

Temperature Regulators

HPAC 7—Self-operated temperature regulators (Series V), designed in either direct or reverse acting types, for heating and cooling applications. They can handle, through the valves, steam, liquids, gases and fluids not corrosive to brass, the manufacturer states. They operate on the liquid expansion principle and since this expansion is proportional to increments of temperature, the valve movement is gradual. The valve supplies only enough steam or cooling medium to maintain the desired control temperature, according to the manufacturer. The thermostatic system can be removed without removing the valve from the piping system. Regulators are available in sizes from $\frac{1}{4}$ to 4 in., for control of temperatures between 25 and 275 F, with a 50 F range of adjustment. Inlet pressure limit is 125 psig and inlet temperature limit, 450 F. [Manufacturer: Farris Stacon Corp., 563 Commercial Ave., Palisades Park, N. J.]

Heat Interchangers

HPAC 8—Heavy duty heat interchangers featuring longitudinal fins on the suction line. These fins are designed to provide maximum heat transfer with low pressure drop, low "Freon" charge and no oil trapping. Capacities are $7\frac{1}{2}$ to 100 tons. Refrigerant connections furnished may be used for silver solder or welded joints. Maximum working pressure is 300 psi. The interchangers, intended to increase system capacity by subcooling the liquid refrigerant, are used for low temperature applications, and applications requiring a low superheat from the coil, the manufacturer states. [Manufacturer: The Heat-X-Changer Co., Inc., Brewster, N.Y.]

Radiant Front Radiator

HPAC 9—Radiant front radiator, with low silhouette (20 in. high), which combines both radiant and convected heat. It has an additional front air inlet designed to assure higher efficiency, and it can be used as a free-stand-

Why does "rain" often form inside roof spaces of a crowded store or school? (pages 19, 32)

Why does moisture gather on a water-and-vapor-proofed concrete floor? (page 32)

Why is it wrong to vent cold roof spaces to a warm inside space? (page 33)

Does a concrete floor slab lose heat only at the edges? (page 40)

In what direction does heat flow by Conduction? Convection? Radiation? (pages 11, 15)

Do "dead air spaces" exist with respect to heat flow? (page 16)

Why do metals radiate and absorb less heat than wood, plaster, rockwool? (pages 13, 46)

Why replace low-conductive air with denser materials of greater conductivity, i.e. ordinary insulation. (pages 11, 13, 14, 29)

The answers to these and numerous other problems of heat and vapor flow are found in the pages of the Fifth Revised Edition of

SIMPLIFIED PHYSICS of Vapor and THERMAL INSULATION

By Alexander Schwartz

Written in simple language easy to understand, yet accurate and complete enough to gratify the scientist. Crammed with information the engineer, architect, public official, builder, contractor, insulator, heating installer, need. Hundreds of universities and technical schools use previous editions as a text.

56 pages of Facts, Figures, Charts, Illustrations, and Explanations of Heat and Vapor Flow; Vapor Permeability; Condensation; Dry Rot; Conduction and Density; Convection; Radiation and Emissivity; Reflection and Absorption. Suggests solutions and illustrated techniques for practical problems of insulation installation, condensation, protection against heat loss or intrusion, radiant heating; cold storage.

For The First Time

TABLE OF ABSORPTIVITY AND EMISSIVITY OF MATERIALS

Plus, Revised and Amplified, the Famous

CHART OF THERMAL INSULATION VALUES

These 2 charts are indispensable to anyone interested in building and heating. THE VALUABLE MANUAL IS FREE! Just fill in the coupon below.

INFRA INSULATION, INC.
525 Broadway, N.Y., N.Y. Dept. H-9

Please send FREE copy of "Simplified Physics of Vapor and Thermal Insulation"

Name_____

Connection_____

Address_____

☐ Send Infra Insulation prices.
☐ Send Infra sample.

In **HERE are the answers**

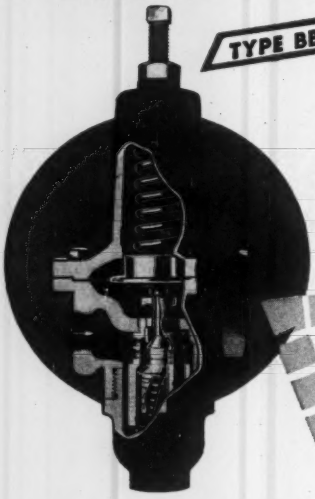
INFRA INSULATION, INC.
525 Broadway, New York, N. Y.
WORTH 4-2241

FISHER®

SELF-CONTAINED
GENERAL PURPOSE

PRESSURE REGULATORS

TYPE BB

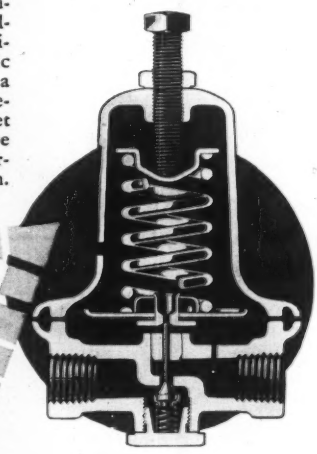


A compact, entirely dependable regulator especially desirable for installations in limited space, on furnace humidifiers, steam tables, sterilizers, pneumatic equipment, and many others. Receives a varying or high pressure at inlet side, delivers a constant reduced pressure to outlet side. Suitable for air, water, non-corrosive gas or oil. For steam service only when furnished with metal valve seat and diaphragm.

PRESSURE RANGE: Reduced—10 to 150 PSI
Initial—Up to 250 PSI

Guaranteed Automatic Control

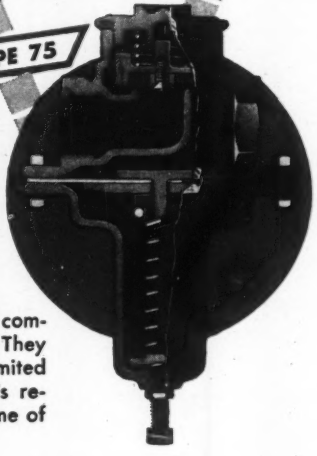
TYPE 67H



The Type 67H is a compact pressure reducing regulator that is ideal for use in small capacity commercial and industrial installations. It offers the following features:

1. Self-contained unit for ease of installation.
2. May be used for air, gas or liquids.
3. Delivers accurate stable control.
4. Provides absolute tight shut-off.
5. Available for inlet pressures up to 400 PSI and reduced pressures from 5 to 100 PSI.
6. Flows up to 165 gallons per hour of water at 250 PSI inlet.

TYPE 75



Unexcelled for cold water on domestic or industrial service. Protects plumbing fixtures, meters, etc., from high pressure surges in city water systems. Receives a varying or high pressure at the inlet side and delivers a constant reduced pressure to the outlet side. Not suitable for temperature over 150° F.

PRESSURE RANGE: Initial—Up to 200 PSI
Reduced—10 to 60 PSI

FISHER offers you the most versatile and complete line of "self-contained" regulators. They are small and compact and have unlimited application. Can be used whenever it is required to control a relatively small volume of air, gas, liquid or steam.

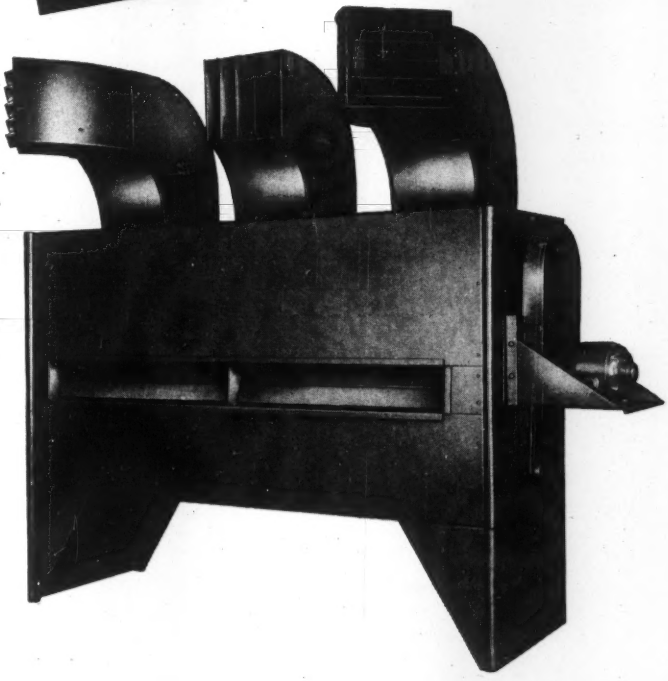
FISHER

FISHER GOVERNOR COMPANY • MARSHALLTOWN, IOWA

LEADS THE INDUSTRY IN RESEARCH FOR BETTER PRESSURE CONTROL

Another STURTEVANT DEVELOPMENT!

IMPROVED INDUSTRIAL HEATER
for heating large plant areas



Two *new* Industrial Heaters with wide applications:

GENERAL PURPOSE HEATER
for manufacturing areas, warehouses, garages, commercial buildings — with standard heating coils.

HEAVY DUTY HEATER
for continuous-duty high-pressure systems, or industrial process work — with wrought iron heating coils.

EXCLUSIVE STURTEVANT FEATURES

HEAVY DUTY HEATERS—For rugged service, wrought iron 1" pipe is used instead of copper tubing. Tapered steel fins are metallically bonded to the pipe. Solder bath provides permanent bonding and corrosion-resisting external coating. Internal steam distributing pipes are also wrought iron, protect against freezing. *The entire coil assembly is as rugged as the connecting steam lines.*

SMOOTH EXTERIORS—Die-formed casings with rounded corners eliminate accident-causing sharp edges and dirt-catching pockets. Removable panels aid inspection.

ONE WARRANTY—Only Westinghouse makes all principal components—fans, heating coils and motors. You get unit engineering and single equipment responsibility.

Other features are:

WIDE RANGE OF SIZES—Heat output up to 2,500,000 btu/hr; air volumes up to 25,000 cfm; steam pressures up to 200 psig. ACCESSORIES—Filter boxes optional for mechanical air cleaning. Mixing boxes optional for proportioning outside and re-circulated air.

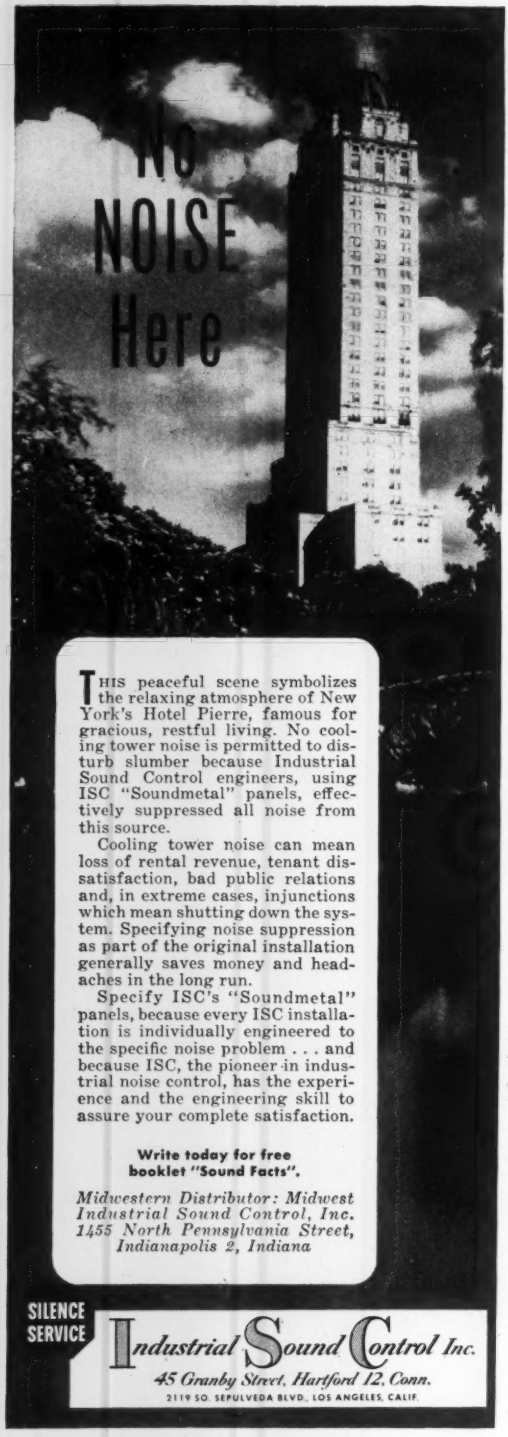
For more information, contact your nearest Westinghouse Sturtevant office. Or write for Catalog 1510, soon off the press. Address Westinghouse Electric Corp., Sturtevant Division, Hyde Park, Boston 36, Mass.

YOU CAN BE SURE... IF IT'S Westinghouse

AIR HANDLING

TUNE IN ON HISTORY! Only Westinghouse brings you complete coverage of political campaign over CBS television and radio.

J-80277



THIS peaceful scene symbolizes the relaxing atmosphere of New York's Hotel Pierre, famous for gracious, restful living. No cooling tower noise is permitted to disturb slumber because Industrial Sound Control engineers, using ISC "Soundmetal" panels, effectively suppressed all noise from this source.

Cooling tower noise can mean loss of rental revenue, tenant dissatisfaction, bad public relations and, in extreme cases, injunctions which mean shutting down the system. Specifying noise suppression as part of the original installation generally saves money and headaches in the long run.

Specify ISC's "Soundmetal" panels, because every ISC installation is individually engineered to the specific noise problem . . . and because ISC, the pioneer in industrial noise control, has the experience and the engineering skill to assure your complete satisfaction.

Write today for free booklet "Sound Facts".

Midwestern Distributor: Midwest Industrial Sound Control, Inc. 1455 North Pennsylvania Street, Indianapolis 2, Indiana

SILENCE SERVICE

Industrial Sound Control Inc.

45 Granby Street, Hartford 12, Conn.

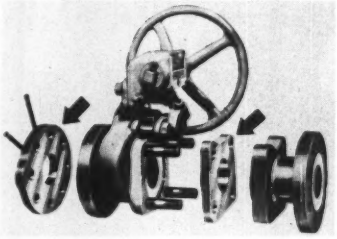
2119 SO. SEPULVEDA BLVD., LOS ANGELES, CALIF.

(Continued from page 192)

"Electronik" potentiometer. The device can be used for laboratory work as well as for industrial flow and automatic control applications. [Manufacturer: Industrial Div., Minneapolis-Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44.]

Electrically Heated Valves

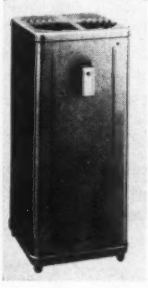
HPAC 16**—Electrically heated valves designed to keep valve mechanisms clear of frost and ice in liquid carbon dioxide lines at temperatures as low as —110 F. Other applications include both hot, cold and viscous liquid and gas lines. Single disc valves require the heating element shown at right in the illustration. Double disc valves can be equipped with both elements shown. Heat

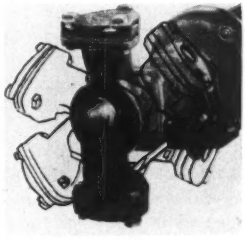


from the elements is transmitted directly to the valve seats, and heats the entire flow opening through the valve, in addition to the operating mechanism. All heated valve sizes from 2 to 6 in. are available, with pneumatic, hydraulic, solenoid or manual control. Heating elements can be provided for either 110 or 220 volt operation, with inputs ranging from 400 to 3000 watts per unit. [Manufacturer: Okadee Co., 332 S. Michigan Ave., Chicago 4.]

Dehumidifier

HPAC 17**—"Aqua-Sorber" dehumidifier, with an automatic control designed to save on power consumption. The control is activated by the moisture content of the atmosphere. There is a 1/5 hp. motor. All models have an "on-off" switch, and the unit is also available without automatic control. [Manufacturer: Walton Laboratories, Irvington, N. J.]



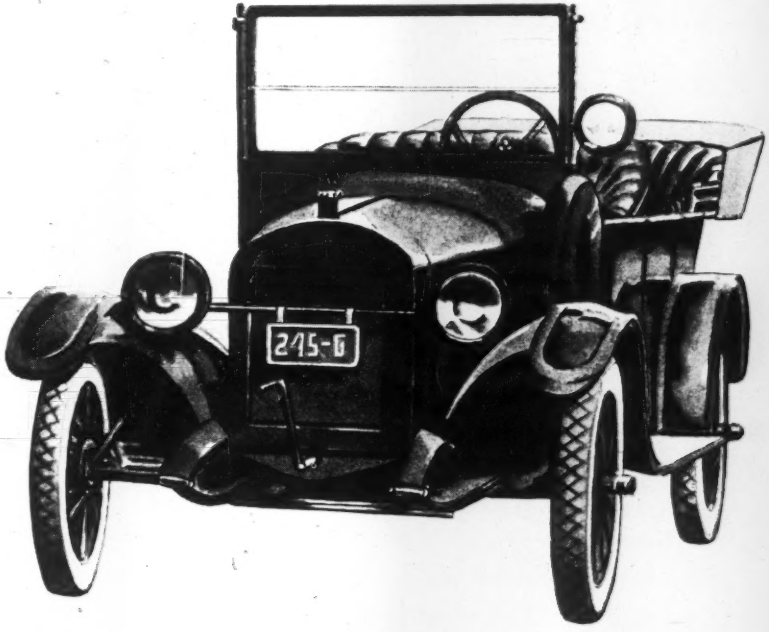


Above: Circulator

Left: Dehumidifier

Horizontal Circulator

HPAC 18**—Improved line of horizontal circulators for hot water heating systems. The entire pump assembly can now be set for any direction of flow by loosening one nut. There is a new bronze open fin impeller which gradually builds up circulation, effecting a sustained head



O.K. IN ITS DAY . . . . BUT

The "Leapin' Lenas" of yesterday have yielded to the modern cars of today. The high-wheeled job might or might not get you there. The trip would be rough, noisy — and expensive. Fuel was converted into big clouds of smoke . . . and tires blew faster than tempers.

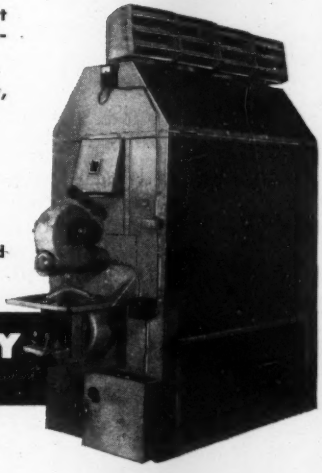
You wouldn't buy a jalopy today . . . so you shouldn't use an antiquated heating system. They, too, can be expensive — converting fuel into great clouds of smoke.

Olson's direct-fired heater, designed for tomorrow, is here today.

AND IT'S HERE WITH THESE FEATURES:

- *Low initial cost*
- *Simple installation*
- *Completely automatic*
- *Efficient, economical*

An Olson heater is O.K. — Today and Tomorrow — and NO BUTS ABOUT IT!



ARTHUR A. OLSON & COMPANY

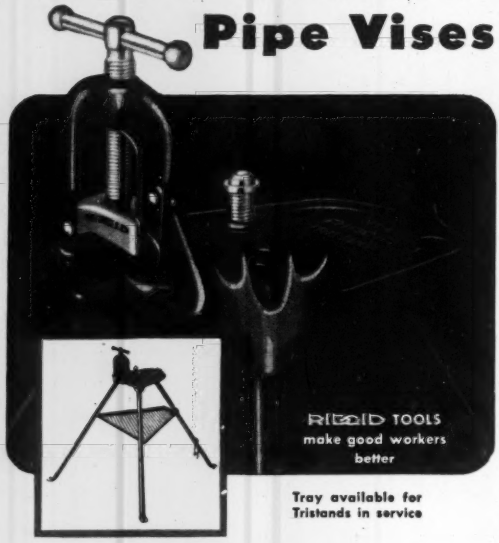
BROAD ST. CANFIELD, OHIO

Write for complete information and engineering data.

Why Good Mechanics Demand

RIDGID

New No. 40 TRISTAND Pipe Vises



Tray available for Tristands in service

Handy tray keeps your tools at your fingertips

★ Tristand is really a portable workbench with a vise—roomy top tray has pipe benders and pipe rest; tool tray below keeps tools handy.

★ That tool tray also makes Tristand extra rigid—won't fold up in use.

★ LonGrip tool-steel vise jaws won't slip, are easy on polished pipe or tubing.

★ No. 40 yoke vise Tristand is 2½" capacity, No. 45 chain vise 4"—buy these work-saver RIDGIDs at your Supply House!

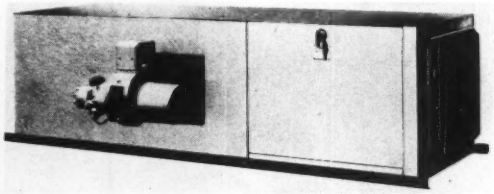
THE RIDGE TOOL COMPANY • ELYRIA, OHIO

RIDGID
Work-Saver Pipe Tools

pressure without overloading the motor, the manufacturer states. The "Neoprene" vibration dampeners are designed to provide vibration-free sound insulation by eliminating metal-to-metal contact. Circulators are available in ¾, 1, 1¼ and 1½ in. sizes. [Manufacturer: Econo Products Co., 17 State St., New York 4.]

Suspended Furnaces

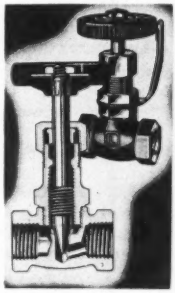
HPAC 19—Four new sizes of suspended furnaces (Models 300, 400, 500 and 600), bringing the complete range of the line from 70,000 up to 240,000 Btu. Each

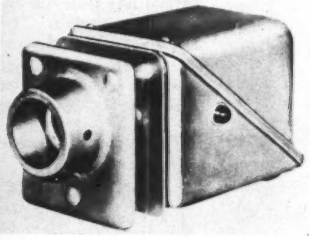


unit is ready to install. These furnaces are tested by the National Board of Fire Underwriters, New York City Board of Standards, and other municipalities and states, according to the manufacturer. [Manufacturer: Quiet Automatic Oil Burner Corp., 33-35 Bloomfield Ave., Newark, N. J.]

Gland Type Bronze Needle Valve

HPAC 20—Gland type bronze needle valve (Fig. 906, globe; Fig. 907, angle) for control on small lines where fine regulation of flow is necessary. It is available in a full range of sizes from ⅛ to 1 in. in both patterns. The handwheel is of non-slip design, lending itself to finger-tip control. The valve is also being produced in an indicator model, the globe type being available in ¼, ⅜ and ½ in. sizes, and the angle in ¼ and ⅜ in. sizes. The numbered gradations indicated on its face permit resetting to a predetermined degree of opening. [Manufacturer: The Lunkenheimer Co., Waverly and Beekman Sts., Cincinnati 14.]





Above: Flame Failure Safeguard

Left: Needle Valve

Flame Failure Safeguard

HPAC 21—"Fireye" flame failure safeguard (Type FI8T-3), for protecting manually ignited oil burners, air heaters, ovens, kilns, etc., which is used with programming controls to protect automatically ignited oil burner installations. It is Underwriters' Laboratory approved. The safeguard consists of a phototube and amplifying system housed in an aluminum case. A time delay element prevents the flame relay from dropping out from purely transient disturbances, and a pilot light, which indicates

Remember the trade marks "tt" and "TUBE-TURN" are applicable only to products of TUBE TURNS, INC.

Engineered to save maintenance manhours

Scrappy says, "Aid defense—more scrap today... more steel tomorrow."

Write Dept. A-9 for free booklet giving Dimensional Data on types, sizes and materials of TUBE-TURN Welding Fittings and Flanges.

THIS TUBE-TURN WELDING ELBOW is engineered for shape, size, dimension, and wall thickness . . . to provide you with permanent, leakproof piping. It is forged by the only process that produces a wall as uniform in thickness and true in circularity as the original seamless pipe . . . guaranteeing accurate fit-up and *full strength throughout.*

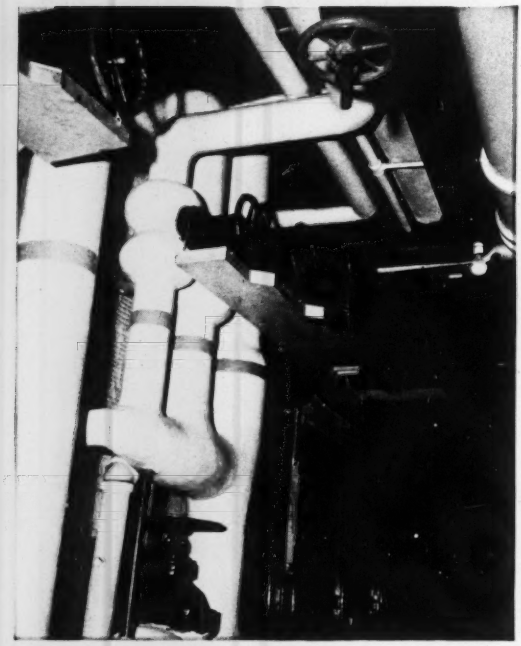
More than ever, any piping installation you make should be maintenance-free, and have extra long life . . . that's why it pays to *specify* TUBE-TURN Welding Fittings and Flanges. For good service call on your nearby TUBE TURNS' Distributor . . . you'll find one in every principal city.

Be sure you see the double "tt"

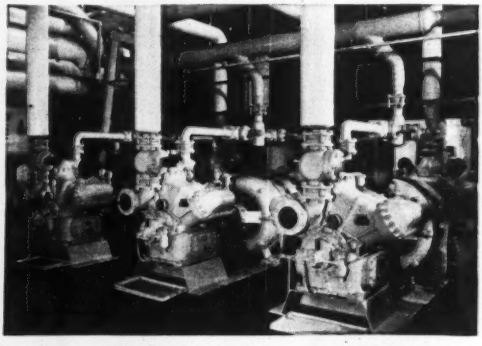
TUBE TURNS, INC. LOUISVILLE 1, KENTUCKY

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Chicago • Houston • Tulsa • San Francisco • Los Angeles
TUBE TURNS OF CANADA LIMITED, CHATHAM, ONTARIO... A wholly owned subsidiary of TUBE TURNS, INC.

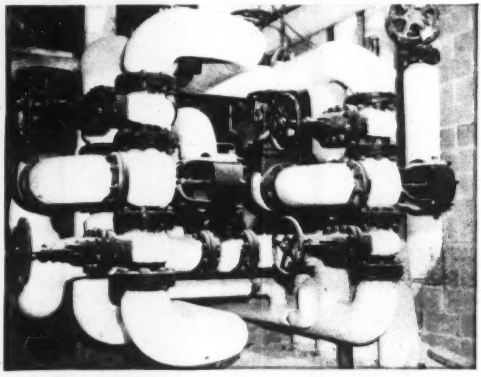
Large buildings cut maintenance with welded piping ...using TUBE-TURN Welding Fittings



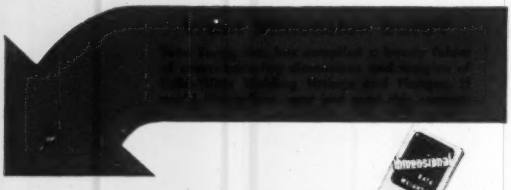
FAMOUS HOTEL—New York's Waldorf Astoria uses 160,000,000 pounds of steam annually . . . and has the most extensive air conditioning system in the world. For top efficiency, all main lines, such as this piping to a steam header, are welded. Directional changes are made with TUBE-TURN Welding Fittings. All necessary types of welding fittings for any job, large or small, can be obtained from TUBE TURNS, INC. . . . which offers the world's broadest line of welding fittings and flanges, in a wide range of types, sizes, and more than 40 different alloys.



DEPARTMENT STORE—Long known for progressiveness in the retail field, the Lazarus Company was one of the first to air condition its selling areas. Facilities have since been extended to all 32 acres of floor space. To keep maintenance to a minimum, an all-welded piping system, using reliable TUBE-TURN Welding Fittings and Flanges, was specified for refrigeration equipment, condensers, pumps, etc. Thus joints are permanently leakproof, and insulation is on for life.



HOSPITAL—All piping from 2" up, for new addition to Mount Carmel Hospital in Columbus, Ohio, is welded, with TUBE-TURN Welding Fittings specified throughout. In this maze of steam piping to a hot water converter, welded piping fits neatly into a small space. With no flanges to work around, insulation was applied easily. This leakproof piping system eliminates the danger of interruption of vital services.



TUBE TURNS, INC., Dept. A-9
224 East Broadway, Louisville 1, Kentucky

Your Name .....

Position .....

Company .....

Nature of Business .....

Address .....

City ..... *State* .....

DISTRICT OFFICES

New York	Houston
Philadelphia	Tulsa
Pittsburgh	San Francisco
Chicago	Los Angeles

"tt" and "TUBE-TURN" Reg. U.S. Pat. Off.

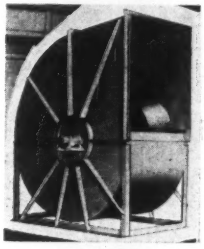
TUBE TURNS, INC.

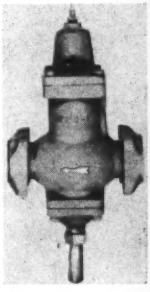
LOUISVILLE 1, KENTUCKY

flame failure, can be viewed through an angle of 180 F. Supply voltage is 115, 208 or 230 volts, on a 50 or 60 cycle current. Ambient temperature limit is 150 F. [Manufacturer: Combustion Control Corp., 77 Broadway, Cambridge 42, Mass.]

Centrifugal Fans

HPAC 22—Redesigned Class I and Class II centrifugal fans with wheel diameters from 40 to 73 in. The new design includes ribs welded to the side sheets and extended radially from the hub. This reduces deflection of the side sheets by 80 percent, according to the manufacturer. The new fans also have all-welded construction, making them dustproof and leakproof. They are available with either quiet, slow speed wheels, or the non-overloading type. Any rotation, discharge, or arrangement is possible, and the line includes both single inlet, single width and double inlet, double width models. [Manufacturer: Herman Nelson Div., American Air Filter Co., 1824 Third Ave., Moline, Ill.]





Above: Fan

Right: Control

Evaporator Pressure Controls

HPAC 23*—"Wolf-Linde" evaporator pressure controls, for use where unvarying temperatures must be maintained, as in cold storage warehouses, chemical manufacturing, etc. These valves, which are offered in port sizes ranging from ¾ through 6 in., automatically adjust to provide predetermined evaporator pressure regardless of fluctuations in suction pressure at the compressor, the manufacturer states. They are available for all refrigerants and with flanged connections — threaded, welding or OD tubing. [Manufacturer: Dersch, Gesswein & Neuert, Inc., 4849 West Grand Ave., Chicago 39.]

Steam Trap

HPAC 24—Type SP piston-operated steam trap for applications where exceptionally large capacities are required.

The trap is small and light, and has a 2 in. orifice. It combines an air vent, strainer condensate discharge and check valve. The strainer is made of phosphor screen for pressures up to 250 psi, and from stainless for higher pressures. [Manufacturer: Velan Engineering Co., 1 Exchange Place, Jersey City, N. J.]

Radiator for Zone Control

HPAC 25**—"Air-rad" radiator for room-by-room zone control. Intended for use in schools, hospitals, motels, etc., it permits users to vary the temperatures of a room or group of rooms by a single thermostat setting.

NEW Oil Boiler

Vertical Flue Ways

Cast Iron

Sectional

Convertible

Casting for intermediate boiler section. Staggered turbulator fins in vertical flue ways swirl rising flue gases for faster, more efficient heat transfer.

Mueller Climatrol

with Outstanding Design Features

- Wide size range for steam, hot water, and hot water supply — inputs of 240,000 Btu to 560,000 Btu. Staggered fins in flue ways turbulate rising gases for greater heat transfer.
- Precision - machined nipple ports and gas-tight vertical flue passages.
- Modern, attractive styling. Easily cleaned from the top without removing casing. Enclosed controls. Casing can be assembled to boiler after boiler is installed and piped.
- Triple tested. Assembled at factory for hydrostatic testing at high pressure and for correct fit. Knocked down for shipment. Conforms to A.S.M.E. code.
- Equipped with Mueller's efficient oil burner which provides efficient combustion, trouble-free operation. A sturdy burner —quiet, vibrationless.

Here it is — an oil-fired boiler with the same superb quality, easy installation features, and money-saving efficiency as the Mueller Climatrol gas-fired boilers.

It's the new Type 35 for steam or hot water; heavy cast iron, sectional, wet nipple boiler — available with tankless heater or can be used for direct hot water supply.

The Type 35 is in a special size range for those larger residential jobs, apartments, small factories, stores — in fact any installation requiring from 240,000 to 560,000 Btu input.

Because the Type 35 is easily converted to gas, it is a perfect answer for areas where people want gas but gas is not now available. Because it is shipped "knocked down", it is easy to get in any basement. Because it has been assembled and "triple tested", you are sure of a low cost installation and long life satisfaction.

Get complete details on the new Mueller oil boiler now. Use the Type 35 on your next job—convince yourself that the Type 35 is a better boiler.

Mail Coupon Today! E-57

Get the whole story

95th Anniversary

L. J. Mueller Furnace Company
2023-R W. Oklahoma Avenue, Milwaukee 15, Wis.
Send me facts and figures — including complete specifications — on your new Type 35 oil-fired boiler.

NAME.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

FOR GAS ★ FOR OIL ★ FOR COAL

INDEPENDENT

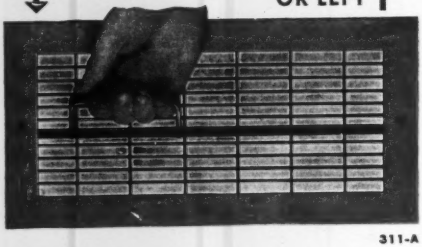
"Fabrikated" WALL GRILLES for Commercial Installations

PROVIDE ADJUSTABLE DIRECTED AIR FLOW

321-A

UP OR DOWN

RIGHT OR LEFT



311-A

Made to fit openings in even inches from 8" x 4' to 60" x 40"

Independent Fabrikated* Adjustable Grilles (patented), rigidly constructed with stamped steel rims and steel bars, are made with either vertical or horizontal grille bars. Grille bars are *adjustable* before or after installation; available also with bars permanently set for straight flow.

Write for new Catalog No. 50—gives schedule of sizes, details and prices.

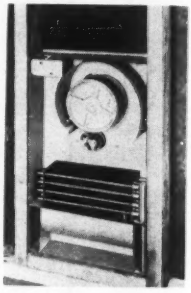
Always Leading — Always Progressing

*Reg. U. S. Pat. Off.

THE INDEPENDENT REGISTER CO.

3747 E. 93rd STREET · CLEVELAND, OHIO

The radiators are sized to fit between standard studdings. Both single and dual models are available, with capacities of 9000 and 18,000 Btu. The smaller unit can be adjusted to the equivalent of from 12 to 60 ft hot water, the larger, to from 20 to 120 ft hot water, according to the manufacturer. When heat is called for, a high velocity pump jets hot water through ¾ in. tubing or pipe at a speed of 10 fps. The systems are installed hooked up in series, and up to 13 radiators can be included. [Manufacturer: Penn Boiler and Burner Mfg. Corp., Lancaster, Pa.]



Above: Tool
Left: Radiator

Shearing Tool

HPAC 26**—Metal shearing tool designed to cut 14 gage stainless steel and mild steel up to ⅛ in. thick — McCoy Products Co., Inc., 420 Felt Bldg., Salt Lake City 1. It is portable, weighing 9 lb, and can be used in almost any bench vise, according to the company. Mounted on a special tripod, the tool can be used as stationary shop equipment.

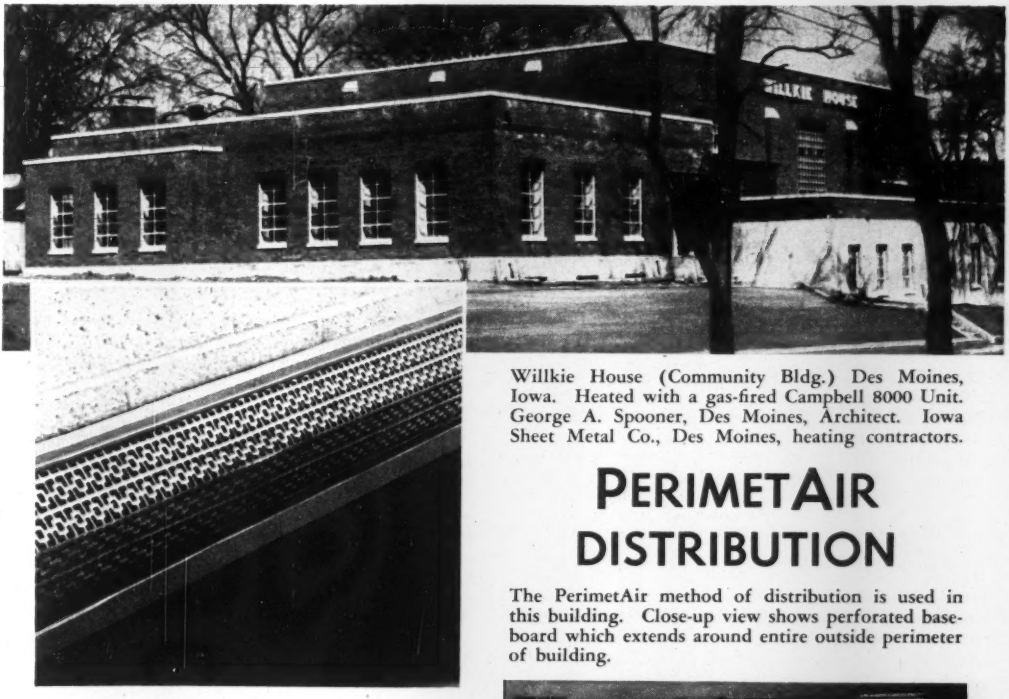
Fuel Oil Heater

HPAC 27—Indirect gas fired fuel oil heater (Type GF) designed to eliminate the need for a steam or hot water boiler in the operation of a No. 6 oil system. It provides its own supply of steam using gas fuel as the primary source of heat energy. The heater is a combination of a small gas fired steam generator and a vertically mounted steam oil heater. An automatically controlled gas flame generates a supply of low pressure steam in the lower section of the unit, and this steam in turn passes in a closed circuit to the upper oil heating section. The condensed steam returns by gravity to the lower section, to be re-evaporated again. This closed steam-condensate cycle permits long periods of operation without the necessity of addition of make-up water, according to the manufacturer. The construction of the unit is such that neither the gas flame nor the products of combustion can come in contact with the oil tubes in the upper section. Manufactured, natural, or bottled gas may be used as the primary fuel. [Manufacturer: Davis Engineering Corp., 1070 E. Grand St., Elizabeth, N. J.]

Expansion Joints

HPAC 28—Improved "Flexon" expansion joints, in both controlled and free flexing types. There is greater pipe line motion control with less overall expansion joint

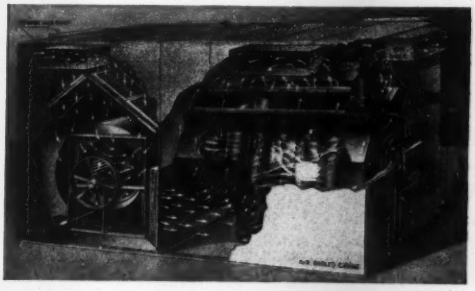
WARM AIR HEATED... by Campbell



Willkie House (Community Bldg.) Des Moines, Iowa. Heated with a gas-fired Campbell 8000 Unit. George A. Spooner, Des Moines, Architect. Iowa Sheet Metal Co., Des Moines, heating contractors.

PERIMETAIR DISTRIBUTION

The PerimetAir method of distribution is used in this building. Close-up view shows perforated baseboard which extends around entire outside perimeter of building.



You will find many opportunities for recommending the unbeatable combination of Campbell Warm Air Heating with PerimetAir distribution. The Campbell Unit assures abundant, economical heat, with positive control of temperature, humidity and ventilation. The PerimetAir distribution system combines the advantages of floor panel radiant heating, baseboard heating and convection warm air heating, assuring perfect comfort.

Write for complete details on Campbell Warm Air Heaters and the PerimetAir method of distribution.

CAMPBELL HEATING COMPANY
Des Moines 17, Iowa

These two compressors, installed in a machinery penthouse on the 11th floor of the Pathé Television Center, New York, are now mounted on Korfund standard steel spring vibro-isolators. The structural steel saddles shown are not ordinarily required, but were used in this case so that original piping could remain unchanged.

...by controlling vibration

When originally installed, each of these two big compressors was mounted on 4 rubber-in-shear rails, which were not the proper isolation for the vibration frequency and floor conditions.

Consequently, vibration transmission through these "mountings" was so bad that it was impossible to use office space on the floor below, and vibration and noise transmitted through the building were picked up on film sound tracks several floors down.

Now, remounted on Engineered Korfund Spring Isolators, the job is entirely satisfactory and has been in operation for the last three years.

Korfund Engineered Vibration Control would have cost no more in the beginning.

A selector chart in Bulletin G-104 gives basic isolation recommendations for both normal and critical operating conditions for pumps, fans, compressors, refrigerating and other types of mechanical equipment. See Sweet's Catalog Files, or write us for your free copy today.

We'll gladly submit recommendations without obligation. A half century of experience is at your disposal.

THE KORFUND COMPANY, INC.

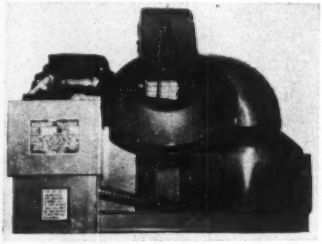
KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

41-01F Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

dimension required to handle a given amount of pipe line expansion, the manufacturer states. A new 3 in. size is offered. [Manufacturer: Flexonics Corp. (formerly Chicago Metal Hose Corp.), 1396 South Third Ave., Maywood, Ill.]

Forced-Air Electric Heater

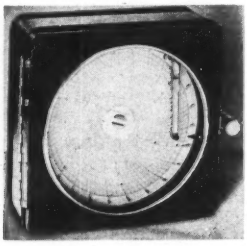
HPAC 29—Forced air 440 volt electric heater for industrial use. It is a complete heating package, 2 ft square, weighing about 100 lb. Rated at 13.1 kw, it develops a heat output of 45,000 Btu and is suitable for heating small shops, for processing applications, or as a portable heater for spot heat, the manufacturer states. It can be used in



combinations of multiple units, may be installed on fire-resistant flooring, or suspended, and can be used with or without ducts. A centrifugal blower puts heat down to floor level from a height of 7 or 8 ft. The blower housing can be rotated. [Manufacturer: Kilbury Mfg. Co., Inc., 14529 Hawthorne Blvd., Lawndale, Calif.]

Dehumidifier

HPAC 30**—Model WA-5 dehumidifier designed to service up to 13,500 cu ft of enclosed space. It is offered in three models: without automatic control (plugged into a 110 volt a-c outlet); with a plug-in control for automatic operation when desired; and with a permanent control built into the unit. Pan and drain disposal are possible. The unit is 29½ in. high, has a diameter of 13 x 13 in., and weighs 86 lb. [Manufacturer: Abbeon Supply Co., 179-15 Jamaica Ave., Jamaica, N. Y.]



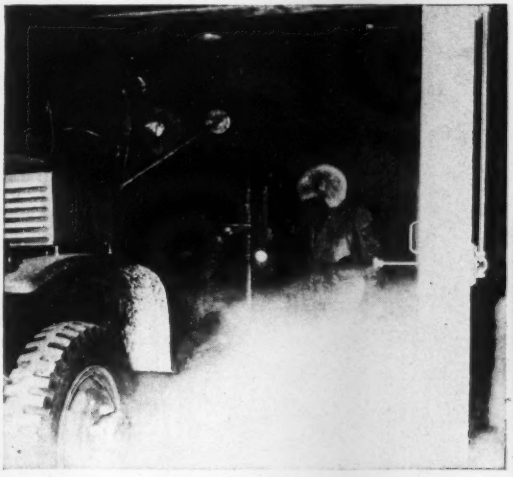
Above: Thermometer
Left: Dehumidifier

Recording Thermometer

HPAC 31**—"Minicorder" recording thermometer designed to aid in temperature balance by affording a permanent record of temperature fluctuations. Type 1-A, a self-contained thermometer 5¼ in. square and 2½ in. deep, can be used for spot checks or where constant knowledge of temperature variation is important. Type 2 is used in cold storage rooms, drying chambers and similar

FOR THIS 90° BELOW COLD LABORATORY

PERFECTION STOVE COMPANY CHOOSES DEPENDABLE BRUNNER REFRIGERATION

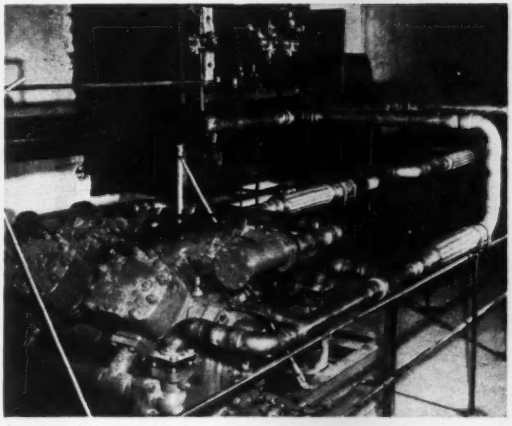


Cold mist rises in laboratory as technicians brave temperatures more than 100° BELOW freezing!

In the new sub-zero testing laboratory of the Perfection Stove Company — man-made temperatures can go as low as –90° F. That's cold enough to change oils and diesel fuels to near solids, and cause many peculiarities to appear in metals.

To produce these blood-chilling temperatures, three Brunner compressors (two 40 HP, one 50 HP) are installed in a two-stage system, using F-22 refrigerant. The entire system is controlled by a single recording temperature controller — at a setting of plus or minus 1½° F.

The precision engineering and extreme attention to detail in the manufacture of Brunner refrigeration make Brunner the logical choice for the *tough* jobs — big or small. Let your Brunner representative show you why hundreds of contractors depend upon Brunner for top performance — minimum maintenance — maximum profits. Or write us — Dept. L-9.



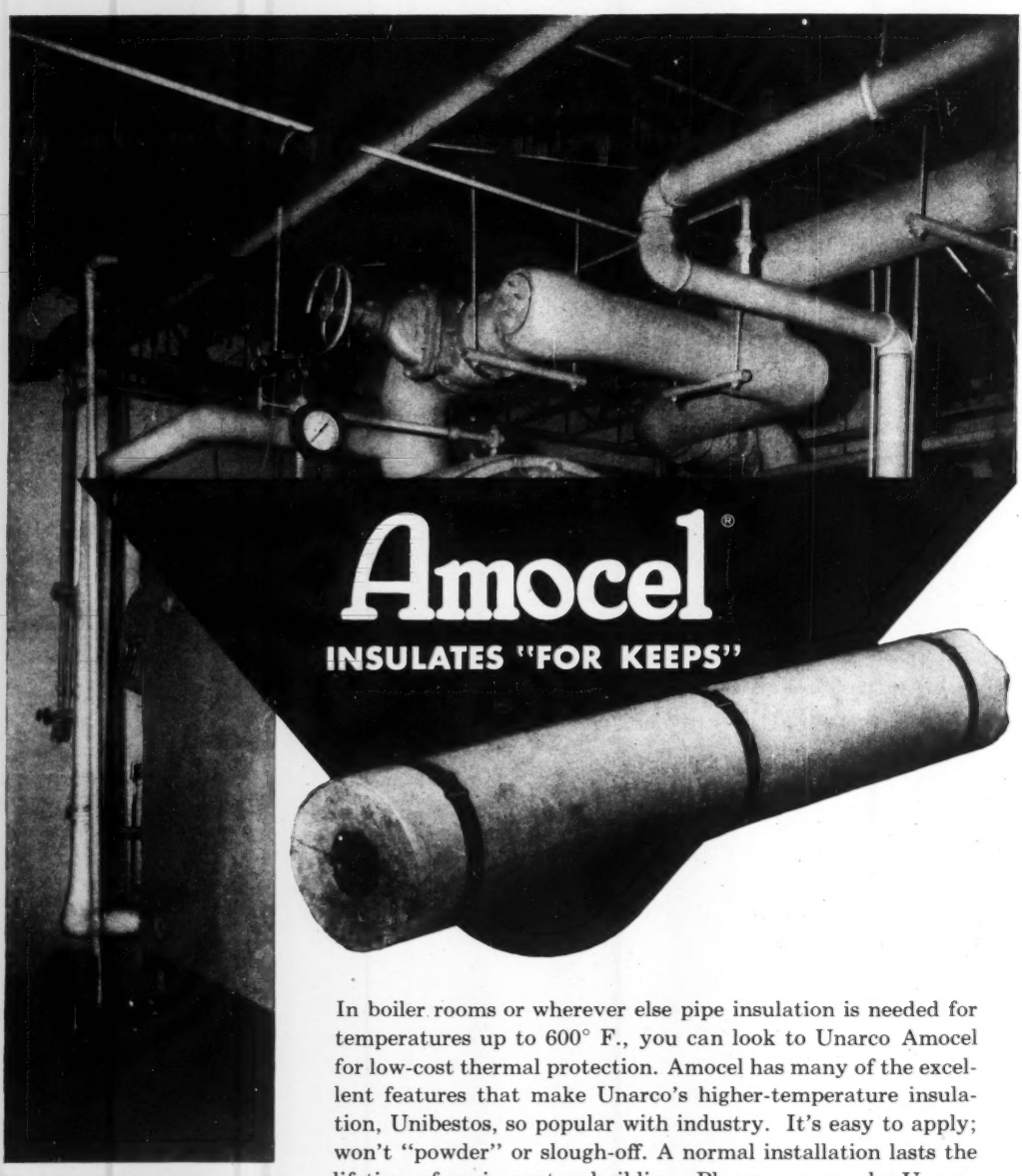
One of the eight-cylinder Brunner compressors on the job at the Perfection Stove Co. laboratory.

This installation of Brunner Equipment installed by Ramsey-Bennett Co., Cleveland, Ohio.

FOR THE TOUGH JOBS — YOU CAN DEPEND UPON — BRUNNER SINCE 1906

REFRIGERATION AND AIR CONDITIONING

● For every air conditioning or refrigeration need . . . Brunner condensing units from ¼ HP to 100 HP — 69 air and water-cooled models. Self-contained Brunner packaged air conditioning units up to 10 HP.



In boiler rooms or wherever else pipe insulation is needed for temperatures up to 600° F., you can look to Unarco Amocel for low-cost thermal protection. Amocel has many of the excellent features that make Unarco's higher-temperature insulation, Unibestos, so popular with industry. It's easy to apply; won't "powder" or slough-off. A normal installation lasts the lifetime of equipment or building. Phone your nearby Unarco Warehousing Distributor for Amocel from stock. Or write us for your Distributor's name and free copy of Bulletin 76-109.

UNARCO

UNION ASBESTOS & RUBBER COMPANY

DEPT. A-9, 332 SOUTH MICHIGAN AVENUE • CHICAGO 4, ILLINOIS

UNARCO

Distributor of the Month

NORTH BROTHERS

BOULEVARD at EIGHTH ST., N. E.

ATLANTA 1, GEORGIA

From offices and warehouses in four cities —Atlanta, Columbia, S. C., Knoxville, and Savannah—North Brothers promptly serves adjacent areas with Unarco Insulations.

Industry, public utilities, heating and air conditioning contractors, and plumbers, all can look to North Brothers for technical aid that helps get the best from good insulations.

Wherever you are throughout the district, you'll find North Brothers near at hand, ready with competent engineering advice and Unarco quality products. Call any of the following numbers:

Atlanta.....ELgin 5731
Columbia, S. C.....43649
Knoxville.....53242
Savannah.....3-5774

INDUSTRIAL Insulations

PRODUCTS OF

UNION ASBESTOS & RUBBER COMPANY

spaces, being mounted outside the space with a connecting tube and bulb inserted through the wall to the cooled area. Many different chart ranges are available which provide a continuous record for 24 hours, or up to a 7 day period. [Manufacturer: The Dickson Co., 7418 Woodlawn Ave., Chicago 19.]

Dehumidifiers

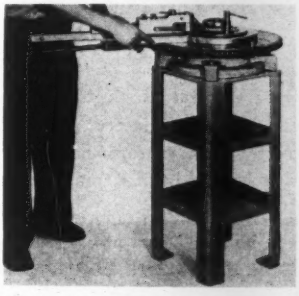
HPAC 32—Two heavy duty dehumidifiers designed to remove 30 to 50 gallons of moisture from the air in a day. They are adaptations of the manufacturer's 3 and 5 ton self-contained air conditioning units, and are suitable for installation in storage spaces, manufacturing and inspection areas, laboratories, etc. Units are completely automatic in operation. An adjustable humidistat turns the mechanism on and off as needed. If desired, it can be set for control of temperature as well as humidity. [Manufacturer: Frigidaire Div., General Motors Corp., Dayton 1.]

Industrial Fan

HPAC 33—Industrial fan built with either an air handling, materials handling or long shavings wheel. It is available in 11 sizes with capacities ranging from 670 to 44,000 cfm and pressures up to 16 in. water gage. The air handling wheel, for exhausting smoke, fumes and light dusts, has backwardly-inclined blades. [Manufacturer: Westinghouse Electric Co., Sturtevant Div., 200 Readville St., Hyde Park, Boston 36.]

Bending Machine

HPAC 34—"Di-Acro" hand operated bending machine (No. 4), designed to bend up to 1 in. diameter cold finished steel bar and 1¼ in. tubing, or their equivalents. It offers a radius bending range from 0 to 12 in. The built-in ratchet mechanism can be engaged or disengaged

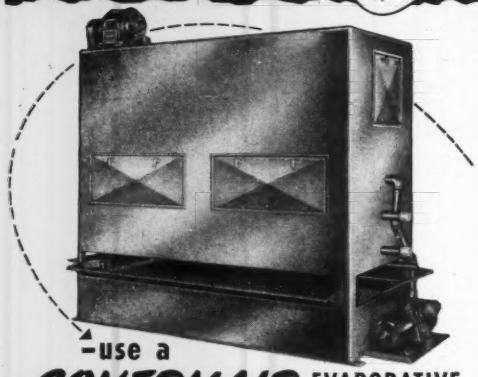


by the operator, depending upon the size of the material being formed. The bender can be changed over from one forming operation to another quickly, the manufacturer states. A special stand is available. [Manufacturer: O'Neil-Irwin Mfg. Co., 541 Eighth Ave., Lake City, Minn.]

Flexible Couplings

HPAC 35—"Chemiseal" flexible coupling, for chemical-resistant piping, composed of a bellows with only two convolutions, assembled with flanges of either cast iron, aluminum or special metals, and embodying integral gaskets. These flexible couplings, made of "Teflon", are suitable for connection to any of the major manufacturers' flanged-end designs of piping, the company states. They

When water is a *Headache...*



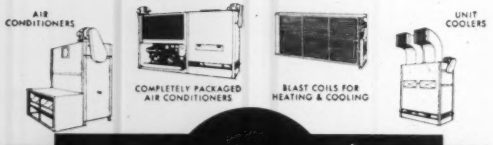
-use a **GOVERNAIR** EVAPORATIVE CONDENSER

Water supply for air conditioning *can* cause you a lot of trouble. When there's a shortage; when rates are expensive or when sewage and piping are impractical—*water becomes a real headache!*

That's when engineers and contractors alike turn to Governair Evaporative Condensers!

Governair Evaporative Condensers eliminate waste-water disposal problems and pumping costs. And they're engineered to give maximum efficiency and performance at a reasonable cost. Available in sizes from 3 to 100 tons.

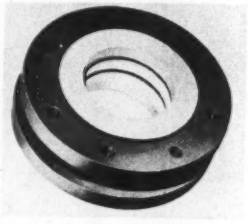
Choose a Governair Evaporative Condenser and there's no need for aspirin! GOVERNAIR CORPORATION, 513 N. BLACKWELDER, OKLAHOMA CITY, OKLA.



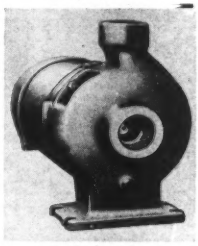
GOVERNAIR

ORIGINATORS OF COMPLETELY PACKAGED AIR CONDITIONERS

can join piping of similar material, and also can join such materials as "Pyrex" to glass-lined steel, etc. The couplings make adapters unnecessary, eliminate the need for slip joints, and take the place of gaskets at the point of use, according to the company. [Manufacturer: United States Gasket Co., 602 N. 10th St., Camden, N. J.]



Coupling



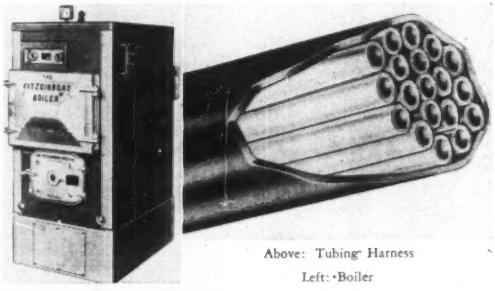
Pump

Packaged Close-Coupled Pumps

HPAC 36—Packaged line of close-coupled pumps (Types SAC and JMC) covering a capacity range from 5 to 150 gpm and heads from 0 to 110 ft, at speeds of 3500 rpm. The packaging is designed to assure immediate delivery. The pumps are used for general service, or as an integral part of equipment such as air conditioning units, cooling towers, evaporator coolers, hot water circulators, etc. The line includes 29 combinations, in $\frac{3}{4}$, $1\frac{1}{4}$, $1\frac{1}{2}$ and 2 in. sizes, available with either three phase or single phase motors. The casings are vertically split, and suction is located on the end. [Manufacturer: Aurora Pump Co., 80 Loucks St., Aurora, Ill.]

Boiler

HPAC 37—Improved model of "R-Z-U Junior" boiler. There are a newly styled cast iron front clean-out and service door, side attached tri-cocks, and water column tappings. The lower water line fits the boiler for installations where low headroom is a factor. It is available in seven sizes with net ratings from 1100 to 3000 sq ft of steam (equivalent in hot water). [Manufacturer: Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York 17.]



Above: Tubing Harness
Left: Boiler

Instrument Tubing Harness

HPAC 38**—"Impervapak Metl-Cor" corrosion-proof instrument tubing harness. It is composed of a bundle of copper or aluminum tubes over which is extruded a $\frac{1}{16}$ in. thick sheath of high molecular weight black polyethylene plastic. This construction is designed to render the tubing impervious to attack from moisture or corrosive

Would you turn your back on a 4-for-1 saving?

MORE THAN 10,000 DOREX USERS are glad they didn't. They're the economy-wise buyers who, over the past twenty years, have made Dorex Air Recovery part of their air conditioning installations.

You see, Dorex Air Recovery "manufactures" *fresh* air by passing *used* air through the famous Dorex C Cell, with beds of specially activated carbon that remove all odorous and gaseous impurities. This means *only about one-third* as much new air need be taken into the system. Substantially less heating and cooling equipment is needed; operating costs are much lower.

Specifically, users' experience has shown that every $100 invested in Dorex Air Recovery should return a saving of $400 on initial air conditioning expense; and, over the years, every $1 spent for Dorex maintenance should produce a $4 saving in operating costs.

Find out how much this four-for-one return can add up to in your plant. Write us for full information.

W. B. CONNOR ENGINEERING CORPORATION

dorex air recovery

W. B. CONNOR ENGINEERING CORP.
Dept. A-92, Danbury, Connecticut

Please send me, without obligation, full information on Dorex Air Recovery.

Name_____

Position_____

Company_____

Street_____

City_____ **Zone**____ **State**_____

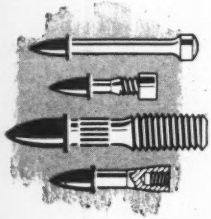
SLASH
Fastening Costs in Steel and Concrete with New Ramset
FASTENING SYSTEM
JOBMASTER
STAR VALUES increase ease, speed, utility and economy of proved RAMSET SYSTEM

Faster loading, one-hand operation with trigger action, hairline accuracy controls, shorter, more compact design and other important features make the new RAMSET JOBMASTER the unmatched tool for high-speed, low-cost, effortless fastening into steel, concrete and other approved materials.

On-the-job experience (not stop-watch laboratory figures) shows less than a minute per fastener from start to finish faster on continuous work. Most jobs prove dollar savings up to 75%, time savings up to 90%. For almost any kind of construction fastenings, nothing sets like RAMSET!

Tru-Set Fasteners hit the spot

Guided by the exclusive, elasticized Red-Tip Pilot, Tru-Set Fasteners go straight to the work—penetrate and hold tightly at the exact spot designated. With 54 sizes and types of Tru-Set drive pins and threaded studs, you can select just the one you need for any specific job.



For new ease, new speed, new utility, new economy, ask your dealer today to demonstrate RAMSET JOBMASTER and Tru-Set Fasteners. Or, write us for details.

Ramset Fasteners, Inc.

Ramset Division, Olin Industries, Inc.

12117 BEREA RD. • CLEVELAND 11, OHIO

Product Patent No. 2470117. Other Patents Pending.

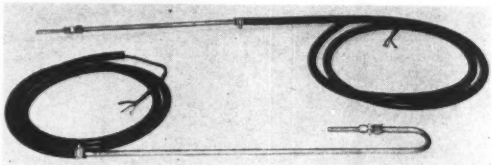
industrial atmospheres. The company's "Impervapak Poly-Cor", a bundle of polyethylene tubes over which the plastic is extruded, also protects instrument tubing against moisture and corrosive atmospheres, as well as against acids and alkalis. [Manufacturer: Samuel Moore & Co., Mantua, Ohio.]

Equipment for Air Purification and Recovery

HPAC 39**—"Nu-Air" activated carbon equipment for air recovery and purification, which removes odors from air and gases by means of adsorption. It is available in cannisters or panels, in standard designs or special designs for specific applications. The company will furnish equipment composed of various metals for use under stringent or corrosive conditions. Used with air conditioning systems, the equipment reduces the amount of fresh air required. [Manufacturer: Aerotrol Engineering Corp., 4135 Brownsville Rd., Pittsburgh 27.]

Liquid Level Control

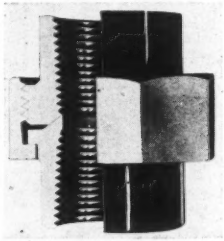
HPAC 40—"Thermasul" electrical system for water and sewage level control and indication. It can be used in wet wells, sumps, reservoirs, elevated tanks, standpipes, etc., and will control pump motors, pump motor speeds,



and supervisory and alarm circuits. The basic element consists of a temperature-sensitive, sintered-sulphide compound around which is wound a resistance heater; the whole assembly being hermetically sealed in a stainless steel tube. [Manufacturer: General Electric Co., Control Dept., Schenectady 5.]

Pipe Union

HPAC 41—Integral steel seat pipe union, made from seamless and forged steel. It is designed for 2000 lb cold water, oil, or gas, non-shock, or 300 lb steam pressure. The union is supplied zinc coated, or in black, and is impregnated with a rust resistant. Sizes now supplied are ½ to 2 in. inclusive, in either brass to steel seat or integral steel seat. [Manufacturer: The Capitol Mfg. & Supply Co., 153 W. Fulton St., Columbus 16.]



Union

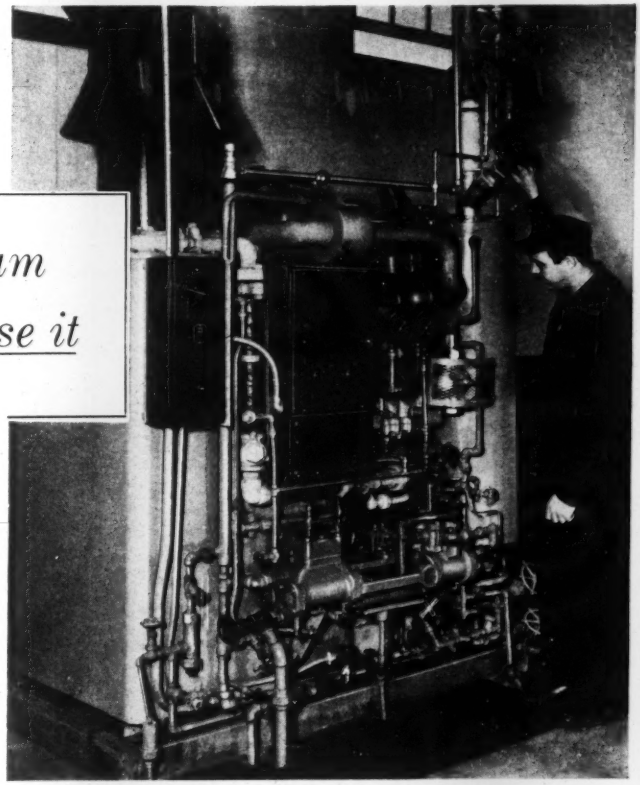
Cóntroller

Electronic Temperature Controllers

HPAC 42**—Electronic temperature controllers using resistance bulb sensitive elements, for controlling operat-

Make your steam
where you use it
with this . . .

PUSH-BUTTON STEAM PLANT



Just push the button — and in a matter of minutes the C-E Re-circulation Steam Generator will give you up to 6,000 pounds of steam per hour at up to 300 psi. That's just about all there is to it.

For the C-E Re-circulation Steam Generator is more than a package boiler — it is a fully integrated, fully automatic, steam plant complete with all controls and accessories, and it takes a minimum floor space . . . about the same as two office desks.

If you have a space 7 feet square by 8 feet high and you need steam for . . .

. . . remote spots not served by present steam lines, or involving long, wasteful pipe lines

. . . occasional loads that exceed the capacity of your present steam generating equipment

. . . highly fluctuating loads and those involving sudden heavy demands

. . . any conditions requiring maximum output from minimum space, with minimum attention.

If you do — or wherever you need a compact . . . reliable . . . automatic source of steam for heat or process — don't just buy a boiler — investigate the C-E Re-circulation Steam Generator. You'll find further details in bulletin p-323a. May we send you a copy?

IF COAL IS YOUR FUEL . . .

. . . investigate the C-E Skelly Stoker for best results with either bituminous or anthracite.

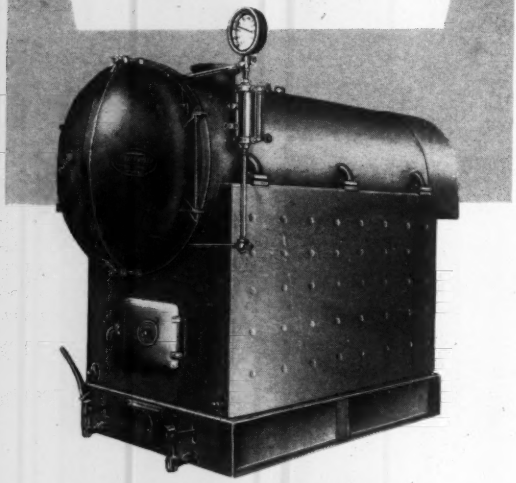
COMBUSTION ENGINEERING — SUPERHEATER, INC.

200 Madison Avenue • New York 16, N. Y.

B-581

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

✓ COMPACT
✓ ECONOMICAL
✓ Engineered for Better Service



TITUSVILLE
"Compact" STEEL HEATING
BOILERS

✓ AUTOMATIC WELDING
—assures strong joints and seams
✓ AMPLE COMBUSTION AREA
—burns all fuels efficiently
✓ POSITIVE CIRCULATION
—with high velocity side circulators
✓ FULL WIDTH FLUE DOORS
—quick access to tubes
✓ MANY OTHER FEATURES

Write for the facts on this famous Titusville Boiler—Bulletin B-3000-B gives you detailed descriptions, specifications and dimensions, free on request.

THE TITUSVILLE IRON WORKS COMPANY
A division of Struthers Wells
Representatives in Principal Cities
TITUSVILLE, PENNSYLVANIA

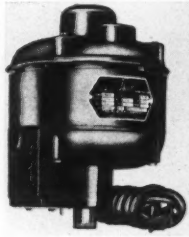
ing temperatures ranging from —100 to 600 F. They are built with single or duplex control action and are available in six different temperature ranges. The standard resistance bulbs cover almost all process applications, the manufacturer states. The instruments have relays with load contacts for operating heating elements, motor starters, electric valves, and signal contacts for the lights in the instrument door. When the temperature at the bulb deviates as little as 0.1 F from control point setting, the controller immediately takes corrective action, according to the company. The control action is continuous. The calibration of the measuring circuit is designed for an accuracy of within ±0.25 percent of the scale range. [Manufacturer: Thermo Electric Co., Inc., Fair Lawn, N. J.]

Stoker Control Panel

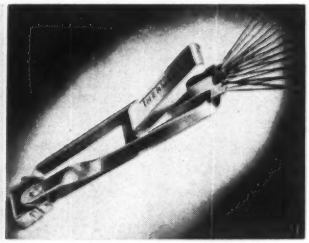
HPAC 43*—Stoker control panel for standardizing stoker operation. Designed especially for schools and similar installations, the panel combines all controls as one unit, with controls grouped and arranged to suit each installation. Using the panel, stokers can be operated by either a common pressure operating control, and/or its individual holdfire control, depending on the setting of the switches. All motors are protected against overload and low voltage. Individual motor control is a feature of the bin feed control system. [Manufacturer: The Will-Burt Co., Orrville, Ohio.]

Sump Pump Motor

HPAC 44—Split phase, drip-proof, 1/3 hp sump pump motor. It meets all NEMA mounting dimensions. A heavy duty ball bearing is provided to withstand thrust load, and there is a built-in float switch. The motors are designed for direct mounting on the support column of pumps and drainers. [Manufacturer: The Hoover Co., Kingston-Conley Div., 68 Brook Ave., North Plainfield, N. J.]



Motor



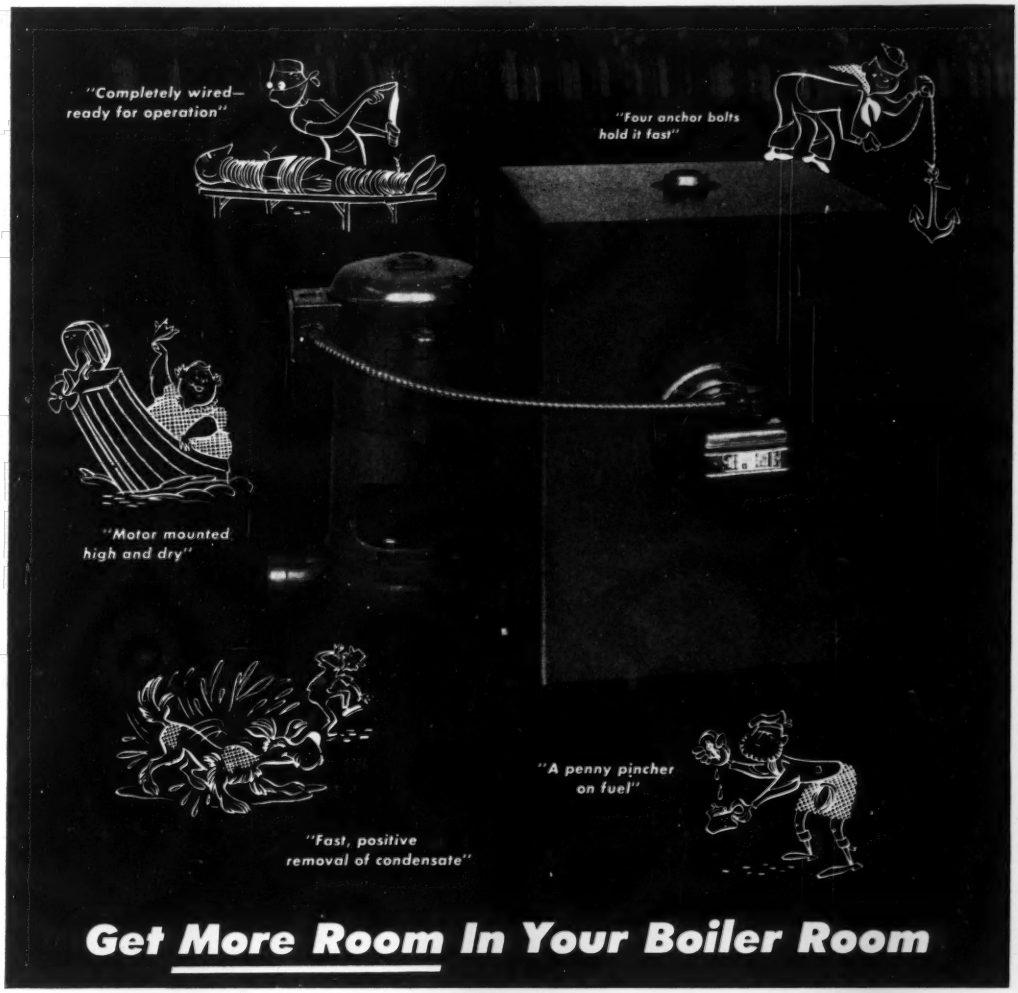
Cleaner

Lighter-Cleaner for Welders

HPAC 45**—"Tip-O-Lighter" tool combining a three-flint spark lighter and tip cleaner. A case of twelve spiral tip cleaners is attached directly to the handle of the lighter. [Manufacturer: Thermacote Co., 301 Mt. Pleasant, Newark, N. J.]

Water Cooled After-Cooler

HPAC 46—Water cooled after-cooler for removing oil and moisture from compressed air. It has longitudinal fins designed to provide maximum heat transfer with minimum air pressure drop. Tubing and fins are copper, and removable for cleaning or replacement. Synthetic rubber


"Completely wired—ready for operation"
"Four anchor bolts hold it fast"
"Motor mounted high and dry"
"A penny pincher on fuel"
"Fast, positive removal of condensate"

Get More Room In Your Boiler Room

You save boiler room floor space when you hook up compact, high speed Dunham Condensate Pumps with side-mounted motors. And because you anchor Dunham Pumps with simple bolts—not with bars and bed plates—you reduce installation expense.

These Dunham Pumps are low in price yet ruggedly constructed and precision engineered to give years of low-maintenance service. High speed motors offer greater head pressure per horsepower. Pumps are designed so that scale and rust, usually found in heating system returns, cannot seriously affect high efficiency and long life of units.

For bigger, neater boiler rooms . . . for better heating . . . better find out about Dunham High Speed Condensate Pumps today, manufactured in both single and duplex models.

Send for Free Bulletin

Bulletin 1401-2 gives full data on pump sizes, construction, capacities. For your free copy write: C. A. Dunham Company, 400 W. Madison Street, Chicago 6, Illinois.

DUNHAM **CONDENSATION PUMPS**

ANOTHER QUALITY PRODUCT OF C. A. DUNHAM COMPANY—CHICAGO • TORONTO • LONDON

GRABLER

Are Time-Cost Saving Tools

Approved by Underwriters' Laboratories

You insist that journeymen use time-cost saving tools. Then use Square "Gee" Pipe Hangers on your next plumbing and heating job; double-check the time-cost of assembling pipe hangers with the pipe and you will discover that pipe hangers can reduce installation costs. Grabler Square "Gee" Pipe Hangers are designed and fabricated to comply with modern engineering and construction practices—they give relief from time-wasting grief. Ask your wholesaler for Grabler Square "Gee" Pipe Hangers.

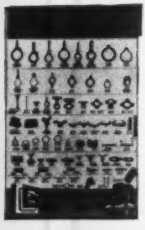
THE GRABLER MANUFACTURING CO.

6565 BROADWAY • CLEVELAND 5, OHIO

THE SQUARE "GEE" LINE INCLUDES: Malleable Fittings • AAR Fittings • Unions • Rail Fittings • Cast Iron Steam and Drainage Fittings • Patented Drainage Fittings • Copper Tube Solder-Joint Fittings • Cast Brass Solder-Joint Drainage Fittings • Steel Pipe Nipples • Hangers

Approved by Underwriters' Laboratories

Approved by Underwriters' Laboratories



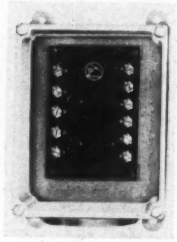
New Wall Chart shows complete range of types of Grabler Square "Gee" Pipe Hangers and accessories. Write for it on your letterhead.

GRABLER

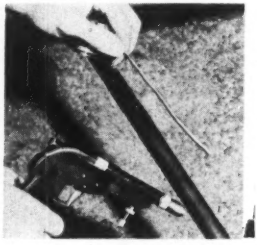
O rings make a positive seal between air and water. The unit cools air to within 10 deg of the water supply temperature, according to the manufacturer. Applicable to compressed air systems from 1 to 15 hp, it may be installed either horizontally or vertically. [Manufacturer: Heat-X-Changer Co., Brewster, N.Y.]

Liquid Level Control

HPAC 47*—Type 10CB1 liquid level control, for chemical and food processing fields, which makes contact with the liquid only through stainless steel probe rods. No floats, bellows, or other moving parts are required in the tank. The control consists of an electrical relay operating from a probe circuit through a transformer and a rectifier. A design feature permits selection from four sensitivity ranges to match the probe circuit to the electrical resistivity of the liquid being controlled. [Manufacturer: Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass.]



Control



Torch

Acetylene-Air Gas Torch

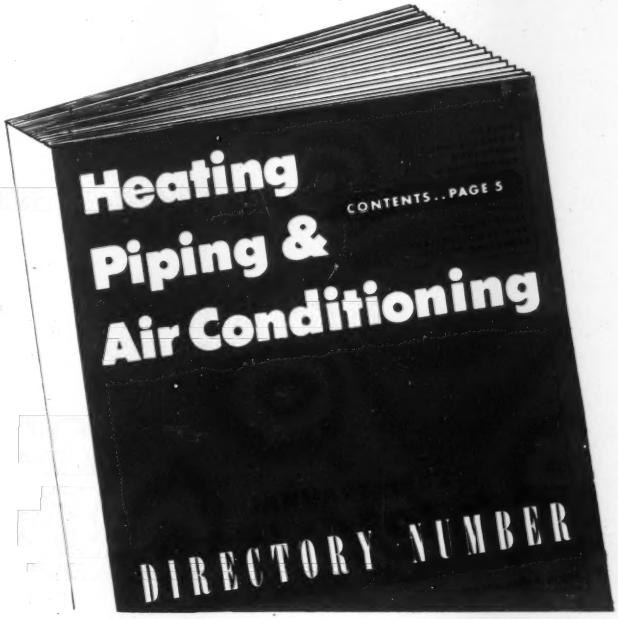
HPAC 48*—"Torch-O-Matic" automatic acetylene-air gas torch. It lights at the squeeze of a trigger and shuts off upon release, and is said by the manufacturer to be especially suitable for intermittent work, as in many heating, piping, air conditioning, refrigeration and sheet metal jobs. The trigger also can be locked open for a continuous flame. The tool weighs 12 oz., and is designed to provide instantaneous heat up to 2800 F. [Manufacturer: Velocity Power Tool Co., 7505 Thomas Blvd., Pittsburgh 8.]

Hydraulic Valve

HPAC 49—Hydramotor hydraulic valve designed to open fully in one minute at temperatures as low as —65 F. It will be available in sizes up to 6 in., with pressure ratings from 2 in. at 600 psi to 6 in. at 65 psi, with good flow characteristics and a minimum of flow pressure drop, according to the manufacturer. It operates for any flowing medium, and will be offered either in remote or manually controlled models. In the event of current failures, the valve is designed to resume operation within 15 minutes after resumption of current. [Manufacturer: General Controls Co., 801 Allen Ave., Glendale, Calif.]

Damper Regulator

HPAC 50**—"Fuelguard" damper regulator, a positioner and quadrant with lubricated bearings, indicator and scale, and with a locking device. It can be manually or automatically adjusted to an infinite number of positions within the required travel of a damper. The indi-



- PRODUCTS CLASSIFIED
- TRADE NAMES
- MANUFACTURERS' ADDRESSES

HERE IS YOUR SOURCE

of Complete Product Information

. . . *Are You Finding It Useful?*

If you are like the average subscriber,* you have near at hand—and frequently use—the January 1952 Directory Number of HP&AC . . . . the field's complete reference guide to the products which engineers and contractors specify and purchase for the heating, piping and air conditioning work they handle.

Each January you get a new, up-to-date HP&AC Directory Edition. It's a part of your annual subscription to our publication.

Soon we will be starting to compile the January 1953 Directory Number.

Have you any suggestions for making the 1953 edition *more* valuable? . . . . suggestions which we as publishers might adopt, or which we can pass along to the many manufacturers who co-operate with us by furnishing complete data on their products in each January Edition?

Your comments are sincerely welcomed.

* **Over 90% of those HP&AC subscribers, answering a recent survey, stated that they find the current (1952) Directory Edition helpful in their work.**

FIRST *in Editorial . in Paid Circulation . in Advertising*

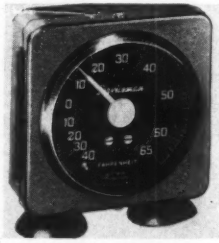
cator and numerical scale make precision adjustments possible, the manufacturer states. This device is designed for use on medium and large heating and power boilers to provide good bearings for damper shafts, positive positioning and control of dampers. It is recommended by the manufacturer for use with automatic combustion control systems, since little power is required to operate the largest dampers. Bearing supports are isolated from the stack to permit insulation and reduce heat at the bearings. Overall dimensions are 14⅜ in., and operating range is 90 deg. [J. P. Ashcraft Co., 5643 Dyer St., Dallas.]

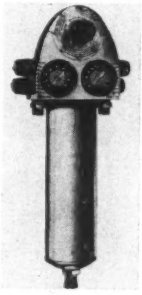
Bushing

HPAC 51—"Magic-Grip" bushing for the "Vari-Pitch" stationary control, wide range sheave. The bushing is designed to make possible quick installation or removal of the sheave and permits mounting it on the shaft so that the adjusting control mechanism is either toward the motor bearing or away from it. The bushing consists of two split-tapered sheaves, one within the other. When they are drawn together with the locking screw, the bushing sleeve is contracted on the shaft and the outer sheave sleeve is expanded against the discs simultaneously to lock the entire mechanism with all working clearances eliminated. [Manufacturer: Allis-Chalmers Mfg. Co., 1171 S. 70th St., Milwaukee.]

Thermometer

HPAC 52—Redesigned "Serviceman" thermometer for use in testing refrigeration equipment and similar installations. In the re-engineered internal mechanism, bourdon tube connections are fitted into female end pieces and silver brazed to form leakproof joints. The recalibrator has been shifted from the face of the dial to the back of the reel plate where it is more easily accessible. Temperature tests to as low as —40 F and up to 65 F can now be made, the manufacturer states. [Manufacturer: Marsh Instrument Co., Skokie, Ill.]





Above: Thermometer

Right: Trap

Moisture Trap for Compressed Air

HPAC 53—Air transformer (Model HLD) for trapping oil and moisture in air lines, which has a built-in, two-stage regulating principle designed to provide easier adjustment of pressures. The control knob actuates a small pilot regulator which operates the diaphragm of the large regulator. [Manufacturer: DeVilbiss Co., 300 Phillips Ave., Toledo 1.]

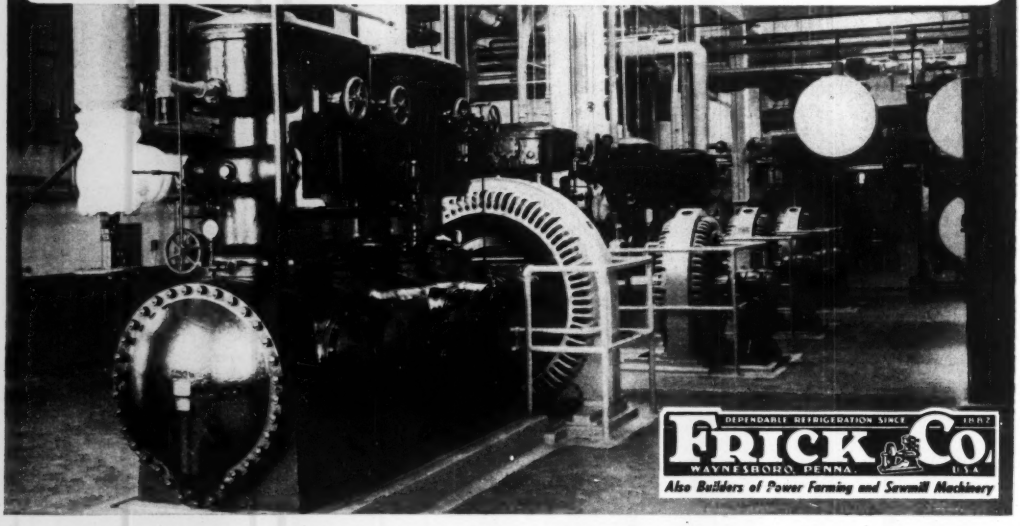
FRICK Refrigeration Serves Lucky Lager Brewing Co.

This Brewery in Los Angeles County, California, one of the finest in the country and one of three Lucky Lager Breweries on the Pacific Coast, uses four large Frick ammonia compressors with unusual reliability and economy in producing 700,000 barrels of beer annually.

Installation by Eckert Engineering Co., Frick Distributors at San Francisco.

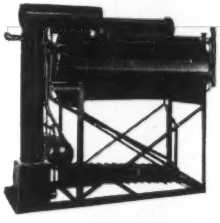
For the answer to your air conditioning, quick-freezing, ice-making or refrigeration problems, look to

FRICK COMPANY • Waynesboro, Penna.

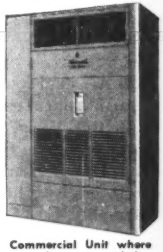

DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
WAYNESBORO, PENNA. U.S.A.
Also Builders of Power Farming and Sawmill Machinery

"I like to sell Servel Air Conditioning because it practically services itself."

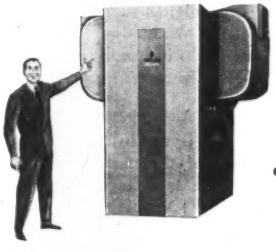
Only Servel Gives All These Sales-Winning Extras!



25-Ton Water Chiller



Commercial Unit where no ducts are needed



All-Year Air Conditioner

Here's the one Air Conditioning that helps sell itself and helps keep itself *sold!* No other refrigeration unit offers all the Servel features . . . no other unit offers such amazing, trouble-free service. This is the famous equipment that has no compressor . . . no moving parts, no vibration, no noise . . . for minimum maintenance, minimum service on your part. (Refrigerating unit carries a factory guarantee of five full years.) This is the famous equipment that uses *heat* to create *cold*—can be connected to present steam source under any pressure; operates on gas, oil, LP gas, even waste heat! You can select the most economical energy source to keep operating costs low. Refrigerant is water in a pressure-free unit for complete safety. Get the facts today—there is a full range of Servel Air Conditioning Equipment so you can sell every prospect from the residential and small commercial buyer to the large commercial, industrial and military type installation.

SELL SERVEL . . . the air conditioning that offers low operating cost, guaranteed dependability in residential, commercial or industrial installations.

Servel

AIR CONDITIONING

Made by the makers of the famous Servel Refrigerator

SERVEL, INC. • Evansville 20, Indiana

Get the facts and you'll sell Servel! Write for complete information today.

Servel, Inc., Dept. HPAC-9, Evansville 20, Indiana

Gentlemen: I'm interested in the money-making advantages of selling Servel Air Conditioning Equipment. Send me full details on ☐ Industrial ☐ Commercial Units.

Name .....

Firm .....

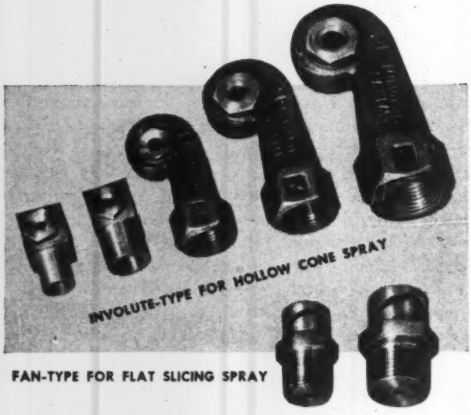
Address .....

City ..... *Zone* .... *State* .....

for • SPRAYING
• WASHING
• RINSING
• COOLING
• AIR CONDITIONING

YARWAY

SPRAY NOZZLES



FAN-TYPE FOR FLAT SLICING SPRAY

Get the most out of your Spraying Equipment with minimum power . . . with efficient spraying.

Use Yarway Nozzles. No internal vanes or other restrictions to clog or hinder flow. Two types—Yarway Involute-type producing a fine hollow spray with minimum energy loss, and Yarway Fan-type producing a flat fan-shaped spray with time-saving slicing action for cleaning.

Wide range of standard sizes and capacities. Cast or machined from solid bar stock.

Thousands in use. Write for new Bulletin N-616.

YARNALL-WARING COMPANY
107 Mermaid Avenue Philadelphia 18, Pa.

EQUIPMENT BRIEFS

PUSH BUTTON SWITCH, a waterproof switch which opens and closes electrical circuits under water, and is designed to function from —65 F to 165 F, and to withstand salt spray, shock and vibration. [Manufacturer: Riverside Mfg. and Electrical Supply Co., 10228 Michigan Ave., Dearborn, Mich.]

"CD 200" *CEMENT FOR BONDING FOAMED PRODUCTS* such as "Styrofoam," "Strux," or cellular cellulose acetate, to themselves, or to wood, glass, metal, leather, and other materials. It does not require heat, pressure, or any special surface preparation. [Manufacturer: Chemical Development Corp., Danvers, Mass.]

RATCHET REPAIR KITS for $\frac{3}{8}$ in. square drive and $\frac{1}{2}$ in. square drive "Superratchets." It contains a complete assortment of replacement parts, and one special spanner wrench. [Manufacturer: J. H. Williams & Co., 400 Vulcan St., Buffalo 7.]

PUMP-PACKING WRENCH designed to allow repacking fuel pumps in 10 min or less. It eliminates the need for breaking oil and fuel lines in repacking. By releasing two bolts on the motor, the mechanic can extend the wrench through the blower housing to remove the packing nut and the packing. The wrench is equipped with a plunger for replacing packing. [Manufacturer: Electrol Burner Mfg. Co., Inc., 22 Union Ave., Rutherford, N. J.]

Model AN guideless rotary *TUBING STRAIGHTENER*, for straightening steel tubing in commercial pipe sizes from $\frac{1}{2}$ to $1\frac{3}{4}$ in. OD. The machine (six steel rolls driven by two chain type drives) will also straighten brass, copper, aluminum and other non-ferrous metal thin wall tubing in sizes up to 3 in. OD. [Manufacturer: Mackintosh-Hemphill Co., 901 Bingham St., Pittsburgh 2.]

One piece *PLASTIC HOUSING FOR WINDOW TYPE AIR CONDITIONER*. Designed for the 1/3 hp model of Philco Corp., it measures 26 in. long, 13 in. wide, and 12 in. deep, and is molded of phenolic compounds. Louvers are molded in. [Manufacturer: Plastics Dept., General Electric Co., Taunton, Mass.]

Three new sizes in "Gyro-Flo" *PORTABLE COMPRESSORS*. Capacities of the new units are 315, 210 and 105 cfm. These are two stage, oil cooled, rotary sliding-vane compressors. [Manufacturer: Ingersoll-Rand Co., 11 Broadway, New York 4.]

SPIRAL WOUND GASKETS, constructed with alternating plies of "Teflon" and stainless steel, for process applications where extreme inertness to chemicals is necessary. [Manufacturer: Flexitallic Gasket Co., Camden 2, N. J.]

"Powerstat" *VARIABLE TRANSFORMER* (Type 10) for low wattage applications involving 50, 100, and 150 watts—The Superior Electric Co., 385 Laurel St., Bristol, Conn. It is rated at 120 volts, 60 cycles, single phase input with an output of 0-120 or 132 volts, 1.25 amp, 150 or 165 VA.

WAREHOUSE STEEL USERS . . .

Our *Personalized Steel Service*

gives you more value for your dollar

Check this list **of extra, money-saving benefits against what you are getting from your present warehouse steel source.**

14 warehouses to draw on—We will conduct nation-wide search for your needs—no *extra* cost.

Technical assistance—Our product experts will work "full-time" helping solve your material or production difficulties—no *extra* cost.

Complete shearing, cutting and burning service—Our modern equipment enables you to get your steel cut quickly and accurately to your specifications—regular warehouse charges apply.

A "one-call" source for all your steel needs—Carbon—Alloy—Stainless—Tubing—Aluminum—Machinery and shop supplies. We stock them all for you—no *extra* charge.

Personalized Service—*All* of our people are trained to treat you right.

Your friendly U. S. Steel Supply salesman puts our service team to work for you. Why not let him help you?

UNITED STATES STEEL SUPPLY DIVISION
UNITED STATES STEEL COMPANY

HEADQUARTERS: 208 So. LA SALLE ST., CHICAGO 4, ILL. WAREHOUSES COAST-TO-COAST

Warehouses and Sales Offices: BALTIMORE · BOSTON · CHICAGO · CLEVELAND · LOS ANGELES · MILWAUKEE · MOLINE, ILL. NEWARK · PITTSBURGH · PORTLAND, ORE. · ST. LOUIS · TWIN CITY (ST. PAUL) · SAN FRANCISCO · SEATTLE

Sales Offices: INDIANAPOLIS · KANSAS CITY, MO. · PHILADELPHIA · PHOENIX · ROCKFORD, ILL. · SALT LAKE CITY · SOUTH BEND · TOLEDO TULSA · YOUNGSTOWN

USS TRADE MARK

UNITED STATES STEEL

Lo-BLAST Economite Gas Conversion Burner

LO-BLAST

POWER-TYPE GAS CONVERSION BURNER

CAPACITIES 70,000 TO 20,000,000 BTU INPUT

Regardless of the size of the heating plant, Lo-BLAST Gas Burners deliver more heat per fuel dollar. In 19 years of actual operation, these power-type units have consistently cut fuel and service costs.

Because primary and secondary air is perfectly controlled from a blower source, the Lo-BLAST Burner is independent of variable natural draft. Hence it is particularly well suited for downdraft boilers. Combustion is completed in an incandescent firebox, with radiant heat applied to crown sheet as well as side walls.

Other features include soft, quiet flame . . . standard controls with positive acting pilot and blower safetys . . . sturdy, fool-proof design . . . easy to install because completely assembled and factory-tested on gas . . . competitively priced.

A Lo-BLAST dealership is profitable! Complete range of capacities and a nation-wide reputation for economy make this burner a strong seller. Write for information.

The standard Lo-BLAST Gas Conversion Burner

MID-CONTINENT
METAL PRODUCTS CO.
1960 N. Clybourn Ave., Chicago 14, Ill.

WE HEAR THAT . . .

VICTOR ELECTRIC PRODUCTS, INC., Cincinnati, has been purchased by *ALLIS-CHALMERS MFG. CO.*, Milwaukee. All "Texrope" sales, engineering, and production facilities will be moved into the new plant from West Allis within the next few months.

Saturday, October 4, has been set as the date for the third annual John Zink Process Heating Seminar, at the *JOHN ZINK CO.* plant in Tulsa. The seminar was organized in 1950 by the company's chief engineer, *ROBERT REED*, to further dissemination of process information.

CORK IMPORT CORP., Englewood, N.J., has announced that its corporate name has been changed to *NATIONAL CORK CO.* The company has increased its operations through the sale of domestic cork insulation, imports now being a small part of the annual sales volume.

Demonstration units, constructed entirely of products in the company's line, are being provided for salesmen and distributors by *UNISTRUT PRODUCTS CO.*, Chicago. The main supporting members are steel channels of various sizes, gages and combinations, bolted together with framing fittings and nuts.

"Circ-L-Scale", a combination compass, scale, square, protractor and letter guide, approved by the American Society of Industrial Engineers, is being offered free on request by the company.

An optional five year warranty plan covering the motor-compressor unit of self-contained air conditioners installed on or after February 12, 1952, is now offered by *WESTINGHOUSE ELECTRIC CORP.*, Pittsburgh. It will be available at a small additional cost. The company will repair or replace any motor-compressor unit failing from inherent defects, will allow for labor costs, and will pay shipping charges on parts repaired or replaced.

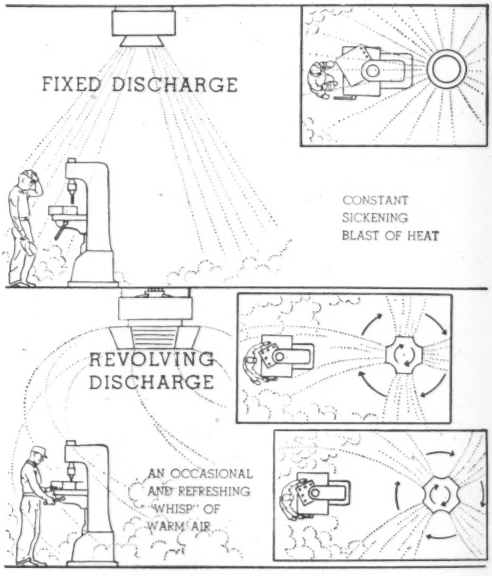
"Odorout" air-freshening lamps, manufactured by Westinghouse, are to be installed in American Airways' entire fleet of DC-3 passenger planes.

MARINE ENGINEERING & SUPPLY CO., Los Angeles, has been purchased by *FIBERGLAS ENGINEERING & SUPPLY CO.*, San Francisco, a subsidiary of *OWENS-CORNING FIBERGLAS CORP.*, and will be known as *MARINE ENGINEERING DIV.*

ROBERT E. SIBLEY was honored recently at a testimonial dinner upon his retirement after 45 years as sales and advertising manager of *LIEMAN BROS., INC.*, Newark, N. J.

A reception and buffet supper for over 300 guests marked the formal opening of *HAJOCA CORP.'s* new Allentown, Pa., display rooms. This is the 12th in a series of showroom and branch openings held within the past nine months.

The BIG difference between "revolving" and "fixed" unit heaters . . .



WING Revolving Unit Heaters are successfully solving the heating problems of thousands of industrial plants today because they assure a uniform, comfortable temperature throughout, with no hot blasts, no cold spots, no chilly corners. Instead of annoying hot blasts, the worker is conscious only of a pleasing sensation of fresh, live, invigorating warmth . . . and in summer, with the steam turned off, the revolving "heaters" become an equally efficient cooling system.

L. J. Wing Mfg. Co.

140 Vreeland Mills Road, Linden, N. J.

In Europe: Etab. WANSON, Haren-Nord, Brussels, Belgium

Factories: Linden, N. J. and Montreal, Canada

Write for a copy of Wing Bulletin HR-6, which discusses in detail the problems of industrial plant heating and in particular the value of revolving discharge.

Wing

REVOLVING UNIT HEATERS

L. J. Wing Mfg. Co.

140 Vreeland Mills Road, Linden, N. J.

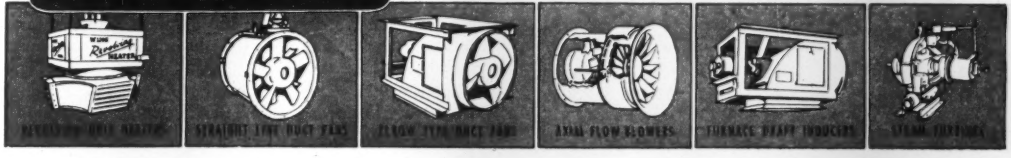
Please send me a copy of your Bulletin HR-6, Wing Revolving Unit Heaters.

NAME .....

FIRM .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....



To carry a wrench for every pipe size would be costly and practically impossible. Especially when several adjustable pipe wrenches will take care of most of your needs. That's the sensible answer to a very ordinary problem.

4200 Series
Cast Iron Tank

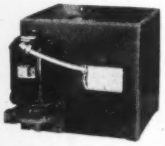
Sterlco CONDENSATION PUMPS

√ EASY to SELECT √ CONVENIENT to STOCK

Yes, only two sizes are required to take care of all jobs up to 15,000 sq. ft. EDR . . . and up to 20 lbs. discharge pressure. The adjustable float switch — so simple to set at required position — plus other Sterlco features make this possible . . . and only possible with a Sterlco Pump.

For you . . . this means less working capital tied up in floor stock. *For your customers* . . . this means that a future increase of radiation may not necessitate the installation of a new pump.

Combine this exclusive Sterlco feature with overall rugged construction and low cost and you find the reason Sterlco PUMPS are first choice of the industry. Yes, Sterlco will always do a better job . . . longer! Send for complete information on Sterlco Pumps.



Sterlco 4100 series for jobs where steel tank is preferred — same features as 4200 series.

STERLING, INC.

3732 N. Holton St., Milwaukee 12, Wisconsin

CONDENSATION AND VACUUM PUMPS

HEATING SPECIALTIES

TEMPERATURE CONTROLS

A new wing, which includes a larger modern drafting room and a new test laboratory, has been added to the plant of *LESLIE CO.*, Lyndhurst, N. J.

HENRY A. BAERENKLAU, president of Baerenklau & Co., Brooklyn, heads the heating, air conditioning and ventilating group of the *SISTER ELIZABETH KENNY FOUNDATION* in its 1952 fund-raising drive.

A sales training school for field representatives of *MCDONNELL & MILLER, INC.*, Chicago, was held recently, with sessions covering the company's line of products and special attention given to newer products.

Plans are under way for the construction of a new plant, covering nearly 240,000 sq ft and constructed of building block, glass and steel, for the *SHENANGO AGALOY TUBE CO.*, Wheatland, Pa.

VAPOR HEATING CORP., Chicago, has set up two new export corporations: *VAPOR EXPORT CORP.*, to handle sales to South America, Mexico, and Central America, except Canada; and *VAPOR INTERNATIONAL CORP., LTD.*, to handle sales to Europe, Africa, Asia, and other countries overseas.

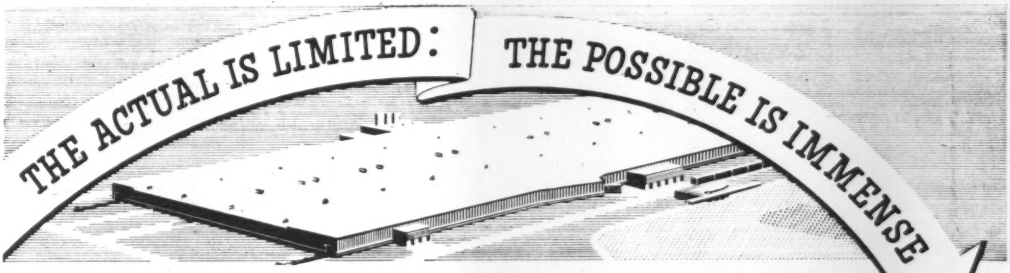
REFLIN CO. has moved from Culver City to a new plant at 16825 S. Broadway, P. O. Box 452, Gardena, Calif., doubling production capacity, according to company officials.

A $30,000 mechanical design award program has been announced by *THE JAMES F. LINCOLN ARC WELDING FOUNDATION*, Cleveland. The 101 cash awards will be given for the best papers by designers, engineers, or manufacturers, on the mechanical design and construction of any type of machine or machine component designed for arc welded steel fabrication. Machinery may be in 18 classifications, including pumping and compressing, and processing.

TODD CO., Rochester, N.Y., manufacturer of bank and commercial checks, is now providing free design service for air conditioning and heating firms seeking to improve the advertising effectiveness of the checks they use.

EFFECT OF TEMPERATURE ON THE TENSILE PROPERTIES OF HIGH-PURITY NICKEL, National Bureau of Standards Report No. 48, 313 (April 1952) covers tensile tests made at temperatures ranging from −320 to 1500 F on annealed specimens of nickel of 99.85 percent purity. The authors, William D. Jenkins and Thomas C. Digges, show that in general, the metal's yield and tensile strength, and also the ductility at maximum load, tend to decrease with increase in temperature. The elongation at complete fracture attains a minimum at about 500 F.

Copies of the report are available from the National Bureau of Standards, U. S. Department of Commerce, Washington 25, D. C.



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1952

WELDED PIPING SAVES TIME . . . SAVES COST

By **William P. Miller,** Secretary
The Smith and Oby Company
Contractors and Engineers
Cleveland, Ohio

AT the Ohio Crankshaft Company's new, modern industrial plant, arc welding has enabled us to simplify the piping details and cut down the time and cost of installation. Fuel and steam headers were fabricated on the site, at low cost, using welding fittings and pipe. Gas, steam and water lines from 2½ inches and up were all welded, reducing space requirements and making it easier to apply insulation.

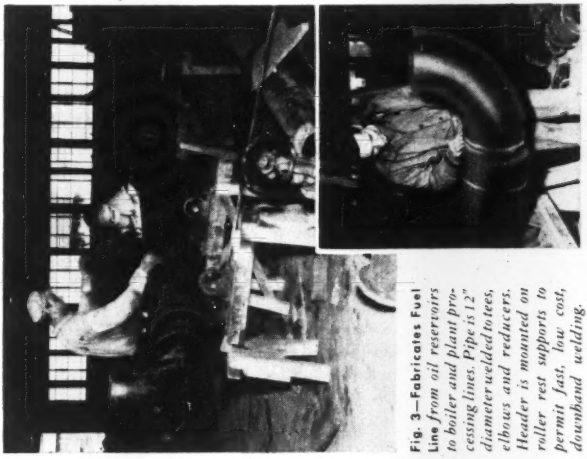


Fig. 3—Fabricates Fuel Line *from oil reservoirs to boiler and plant processing lines. Pipe is 12" diameter welded to tees, elbows and reducers. Header is mounted on roller rest supports to permit fast, low cost, downhand welding.*

FABRICATES HEADER

Fig. 1—Steam Header *fabricated at low cost from welding fittings and pipe is simple and compact. Joints are beveled 60° and welded with three passes of "Fleetweld 5"* using Lincoln "Shield-Arc"* engine driven arc welders.*

SOLVES SPACE PROBLEMS

Fig. 2—Installs Overhead Piping *at The Ohio Crankshaft Co., Tocco Division, the world's largest manufacturer of induction heating equipment. 10" line is all welded, using short turns. Welded piping is easier to install, simpler to insulate . . . saves space between pipe and ceiling.*

*Preferred standards for electrodes and welders on quality work.

CUTS COSTS

Bulletin 403, Welding Guide, free on request. Write to Dept. 282,

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

WATER HEATERS
OR
CONVERTERS

• Residential
• Commercial
• Industrial

Especially designed to supply hot water requirements for heavy and peak intermittant demands. These water heaters, or converters supply hot water to radiant heating panels or hot water systems. Live or exhaust steam in the converters' shells heats the water flowing through the tubes. They are designed for a working pressure of 150 lbs. per sq. in.

There's a wide range of sizes and capacities for every water heating need.

Behind the technical lore of an M & L engineer lie thousands of successful Manning & Lewis installations in every type of residential, business and industrial building. Let this experience and knowledge knock the drudgery from your next tough job.

Fully describe your requirements when you write—your inquiry will receive prompt and courteous attention. Bulletin 780 is yours on request.

for
Industrial Plants Apartment Houses
Schools Hospitals Laundries
Hotels Clubs Dormitories
Public or Office Buildings

SALES REPRESENTATIVES IN PRINCIPAL CITIES

1804

Manning & Lewis
Engineering Co.
32 Ogden Street Newark 4, New Jersey
HEAT EXCHANGE EQUIPMENT

M&L

WHO'S WHAT

ARTHUR H. WOODWARD has been appointed chairman of the board of directors, *INTERNATIONAL REGISTER CO.*, Chicago. He is succeeded as president by *ANSEL M. KINNEY*, formerly executive vice president.

Four executives of *CRANE CO.*, Chicago, have taken new assignments. *F. F. ELLIOTT*, previously vice president in charge of branches, now holds the newly created post of senior vice president in charge of sales. *GEORGE L. ERWIN, JR.*, formerly manager, jobbed products department, is now vice president in charge of heating sales. *H. H. BUNCHMAN*, who has been treasurer, is now vice president and treasurer. *A. H. PRASSE*, assistant manager of branches since 1943, is now general manager of branches.

WAGNER ELECTRIC CORP., St. Louis, has appointed *A. CALLAWAY ALLEN* as sales manager, Electrical Div., to succeed *H. A. HUDSON*, who is now sales analyst for the company. Mr. Allen, previously manager of the electrical sales branch at Memphis, joined the company in 1930.

The new committee chairmen of the *STOKER MANUFACTURERS ASSOCIATION* are: *D. L. GETZ*, Steel Products Engineering Co., Springfield, Ohio, engineering and research committee; *CLAUDE A. POTTS*, U. S. Machine Corp., Lebanon, Ind., government relations committee; and *GEORGE W. GRAHAM*, Eddy Stoker Corp., Chicago, membership committee.

MILTON R. PAULSEN, formerly instructor of heating and air conditioning, Milwaukee School of Engineering, has been named manager of the training department of *THE TRANE CO.*, La Crosse, Wis. *ARNOLD B. MEDBERY* has recently joined the products engineering department, where he will handle engineering standardization in the design and development of air conditioning and refrigeration products. He had been with the Elliot Co., Jeannette, Pa.

THE SCHAIBLE CO., Cincinnati, has appointed *FRANK J. NUGENT* as vice president in charge of sales. He had been with Borg Warner Corp.

JOHN H. THOMAS, previously manager of the Homewood manufacturing and repair plant of *WESTINGHOUSE ELECTRIC CORP.*, at Pittsburgh, has been named manager of manufacturing at the firm's East Springfield plant.

DR. GEORGE S. BACHMAN is now director of research for the Fiber Glass Div., *PITTSBURGH PLATE GLASS CO.*, Pittsburgh. He joined the company in 1947, and has been with the division's research laboratories at Creighton, Pa.

Installs Heavy Piping runs in 4000 ft. tunnel

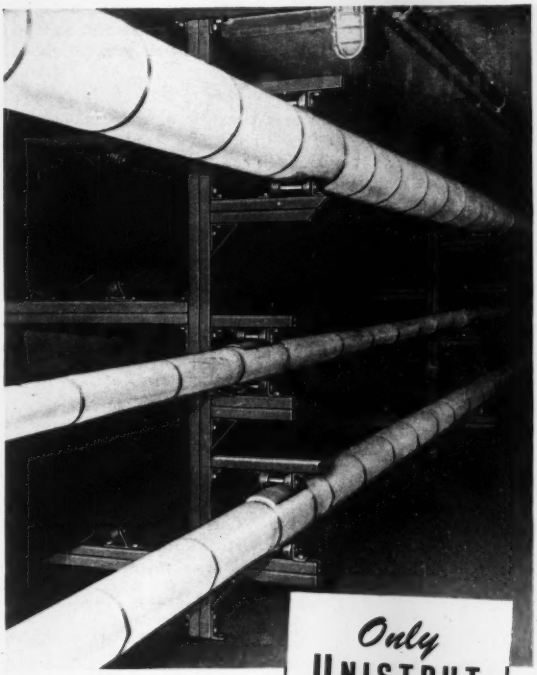
with versatile UNISTRUT®

channel, pipe rollers and concrete inserts

Adjustable UNISTRUT framing assures exact slope or pitch, permits changes and additions at any time. Easy to erect—no special tools or equipment needed.

Photo shows how UNISTRUT framework's great strength easily supports long runs of heavy piping, including bulky 16" chilled water lines, in recent tunnel installation at the University of Houston, Houston, Texas.

W. S. Bellows Construction Corporation, General Contractor; Reg. F. Taylor, Engineer; C. Wallace Plumbing Company, Mechanical Contractor; A. C. Finn, Architect.

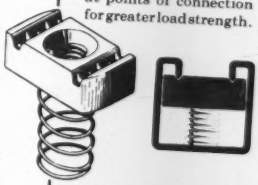


Conserves steel • reduces manpower hours • cuts overall costs

The UNISTRUT system of mechanical supports includes steel channel, concrete inserts, roller pipe supports, brackets, clamps and many other standard parts which combine to form the world's most flexible system of support or suspension. It's easy to work with, lasts indefinitely and presents a neat and orderly appearance.

You save time in engineering detailing and eliminate the need for trained erection crews—you get fast, on-the-job framing assembly where adjustments are made and supporting members added as the work progresses. Try it on your next piping job!

Only **UNISTRUT** offers this Spring-held Clamping Nut which ties together both sides of the slotted channel and forms a *Box Section* at points of connection for greater load strength.



UNISTRUT Products are Bonderized

FOR DEFENSE PRODUCTION

Every day the value of UNISTRUT products is being proved by their use in Defense Industries and Armed Services installations where flexibility, and assembly and erection speed count most.

Representatives and Warehouse Stocks in Principal Cities
Consult Your Telephone Directories

U. S. Patent Numbers 2327587 2329815 2345650 2363382 2380379 2405631 2541908 Other Patents Pending

The World's Most Flexible All-Purpose Metal Framing

Write today for your FREE copy of New 78-page Catalog No. 700! Includes countless examples of how to mount, rack, frame, suspend and support all kinds of mechanical and electrical equipment.

UNISTRUT PRODUCTS COMPANY
1013 W. Washington Blvd.
Chicago 7, Ill., Dept. H9

Please send without obligation the items checked below:

☐ Catalog No. 700 ☐ UNISTRUT Sample

Name_____

Company_____

Address_____

City_____ Zone____ State_____

Four executives of *KRITZER RADIANT COILS, INC.*, Chicago, have been promoted. *C. G. NEWTON*, chief engineer, and *M. A. LUCCHESE*, purchasing agent, have been named vice presidents. *HENRY KRITZER, JR.*, manager of the order department, is now secretary, and *CLAY SCHEDLER* has been appointed general sales manager.

C. L. HOSHAW is the new manager of construction, to oversee insulation and built-up roofing contract units for *THE PHILIP CAREY MFG. CO.*, Cincinnati. He had been contract manager in Indianapolis.

H. B. PHILLIPS is the new sales manager, Quantity Sales Div., *CUTLER-HAMMER, INC.*, Milwaukee. He had been manager of appliance sales. *F. A. WRIGHT*, formerly assistant general sales manager, is now sales manager, district sales; and *J. M. COOK*, previously manager of the San Francisco district sales office and plant, is now sales manager, Industrial Control Div.

PALMER MFG. CORP., Phoenix, has appointed *JACK CANADY* as sales promotion manager. For the past two years he has been secretary-manager of the Appliance Merchandisers Association.

HENRY G. STRONG, Carrier Corp., has been elected chairman, *REFRIGERATION INDUSTRY SAFETY ADVISORY COMMITTEE*, New York, at a recent meeting.

EDWARD L. HART, Philco Corp., is now vice chairman, and *ROBERT L. WILLIAMS*, E. I. du Pont de Nemours & Co., Inc., has been re-elected treasurer.

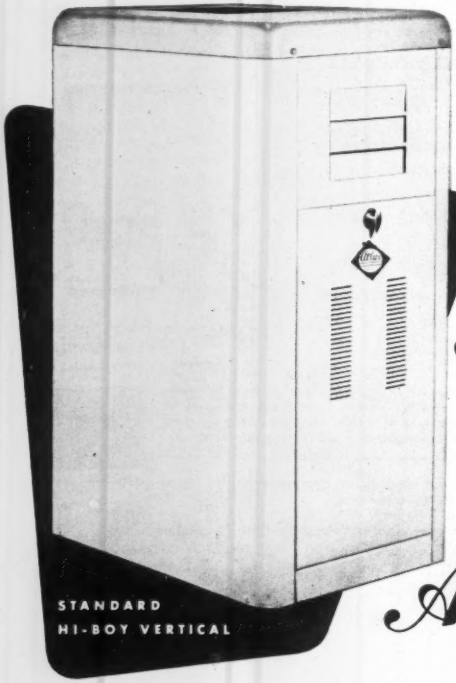
HARRY L. SMITH, JR., has been named staff manager, product sales, for *ALUMINUM CO. OF AMERICA*, Pittsburgh. *W. T. MITMAN*, previously with the Washington, D.C. sales office, succeeds him as manager of sheet and plate sales.

C. P. BARRETT has been appointed manager, industrial insulation sales, for *PITTSBURGH CORNING CORP.*, Pittsburgh. He has been with the company since 1947.

COL. HERBERT MILWIT has assumed command of the engineer research and development laboratories, U.S. Army, Fort Belvoir, Va.

EUTECTIC WELDING ALLOYS CORP., Flushing, N.Y., has appointed *HELMUT THIELSCH*, formerly of the Welding Research Council, to the post of director of applied welding engineering.

R. H. MORSE III has been appointed general manager of the Beloit, Wis., works of *FAIRBANKS, MORSE & CO.*, Chicago. He succeeds *ORREN S. LESLIE*, who has been named manager of manufacturing, and is transferring to Chicago.



ADD *Glamour*
to your
BOILERS AND FURNACES
with
ATTRACTIVE,
DISTINCTIVE

Atlas STEEL CABINETS

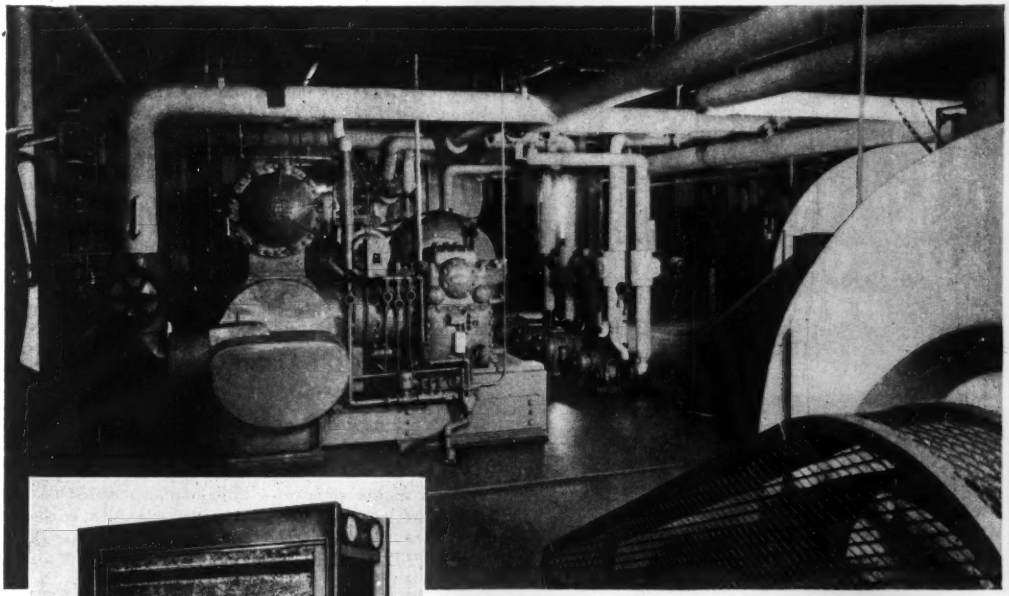
Attractive, tailor-made Atlas Cabinets have stream-lined rounded corners, modern hardware and are beautifully finished in oven-baked hammerloid in colors of your choice. There are no bolts or screws and it fits together smoothly and quickly, producing savings in installation costs.

Atlas Cabinets are built to your specifications. They will carry your name and trademark and not that of Atlas. We can produce a full range of all models.

Send Your Specifications for Free Cost Estimates to

Atlas MANUFACTURING CO.

EUSTIS AT ROBBINS ST • ST. PAUL 4, MINN.



Equipment room of Neisner's Rochester, N. Y. store where conditioned air is filtered in 3 units, each consisting of 2 sections, of Staynew Automatic Filters.

STAYNEW Automatic
Self Cleaning Type Filter

Where Automatic Filters are used

Neisner's Specify STAYNEW

For Air Conditioned Stores

More consistent filtration . . . more efficient operation . . . more effective control of dirt and dust in sales area than conventional filters. *ALL* good reasons why Neisner Brothers Inc., national retail chain, specified Staynew Automatic Air Filters in their large post war stores.

Staynew Automatic Air Filters adapt themselves to all types of air conditioning systems—cooling, either by direct expansion or chilled water; heating, or refrigeration. Self cleaning and easily supervised by laymen, Staynew Automatics stay on the job 24 hours a day at peak efficiency.

Let Staynew show you how to filter larger volumes of air at *lower* cost. Write for descriptive folder.

REPRESENTATIVES IN PRINCIPAL CITIES

DOLLINGER
REG. PROTECTOMOTOR U.S. PAT. OFF.
STAYNEW FILTERS

DOLLINGER CORPORATION

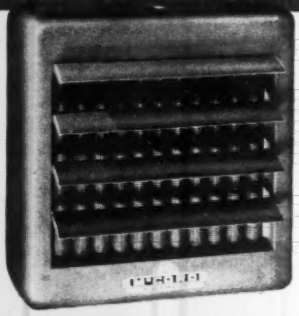
9 Centre Pk., Rochester 3, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

McCORD

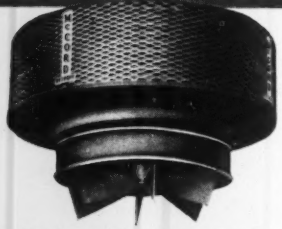
HEATING AND AIR CONDITIONING PRODUCTS

HORIZONTAL TYPE UNIT HEATERS



Modern design—top performance—thousands in use—dependable heat. All copper coils to resist corrosion — individual tube expansion — most rugged construction — quiet operation — easy installation—standard motors with standard bases. Sizes to 272,000 B.T.U. capacity.

VERTICAL TYPE UNIT HEATERS



A proven heating unit—all copper coils to resist corrosion. McCord spiral tube fin construction creates air turbulence without undue restriction. Improved fan delivers large volume of air, with minimum air noise. All McCord heaters are guaranteed for use with 150 lbs. saturated steam pressure. Sizes to 575,000 B.T.U. capacity.

McCORD CORPORATION
DETROIT 11, MICH.

A. O. SMITH CORP., Milwaukee, is consolidating its Water Heater Div. and Heating Div. into a new Permaglas-Heating Div., with headquarters at Kankakee, Ill. *F. S. CORNELL* is the general manager of the new division, and *J. F. DONNELLY*, president of the Gas Appliance Manufacturers' Association, is assistant manager. *S. E. WOLKENHEIM* is marketing director, and working with him are *J. S. ROBINSON*, product manager for furnaces, conversion burners and other products; *D. D. WILLIAMS*, sales engineer; and *DON A. LeROY*, sales promotion manager. *J. W. LONG*, resident manager of the former Heating Div., is now supervising the movement of equipment from Toledo to Kankakee, where all the manufacturing and marketing personnel of the division will be transferred. The company has recently introduced a line of warm air furnaces.

W. A. FINN has been named assistant general sales manager of *WORTHINGTON CORP.*, Harrison, N.J. He is returning from Paris, where he has been serving as general European manager. Four men have received promotions in the company's Buffalo plant. *HAROLD W. WHITING* is now assistant to the executive engineer; *W. A. SCHEERER* is chief engineer, Compressor Div.; *W. J. BLESSING* is consulting engineer; and *WM. M. KAUFFMANN* is chief engineer, Engine Div.

The new general sales manager, Industrial Div., *MINNEAPOLIS-HONEYWELL REGULATOR CO.*, is *C. L. PETERSON*, who has been regional manager for the midwest. He succeeds *W. H. STEINKAMP*. *RALPH A. ROCKWELL*, formerly director of engineering at Mason-Neilan Co., Boston, has been named technical consultant for the company's Valve Div. In addition, *Z. A. MARSH* has been named sales manager of the School Div. He had been manager of the Oklahoma City office.

WALTER KIDDE CONSTRUCTORS, INC., New York, has appointed *TAYLOR MILTON* as vice president. He has been vice president and chief engineer of a subsidiary, Walter Kidde Engineer-Southwest, Inc., at Houston, and will continue in that capacity as well.

PAUL R. LARIMER has been appointed general sales manager of *ANSUL CHEMICAL CO.*, Marinette, Wis. Formerly, he supervised the company's government relations program and served as assistant sales manager of the Fire Extinguisher Div.

WILLIAM G. VAN BECKUM, recently appointed director of research and development, *THE PACIFIC LUMBER CO.*, will be associated with long-range development in the low temperature and insulation fields. Since 1948 he has been manager of technical service and assistant sales manager, Special Products Div., Weyerhaeuser Timber Co., Longview, Wash. He will make his headquarters at the firm's San Francisco office.

WILLIAM H. OLD has joined *THE BABCOCK & WILCOX CO.* as director of purchasing. He will be located in the New York office. Formerly, he was general

FROM OUR FILE OF HEAT INSULATION JOBS

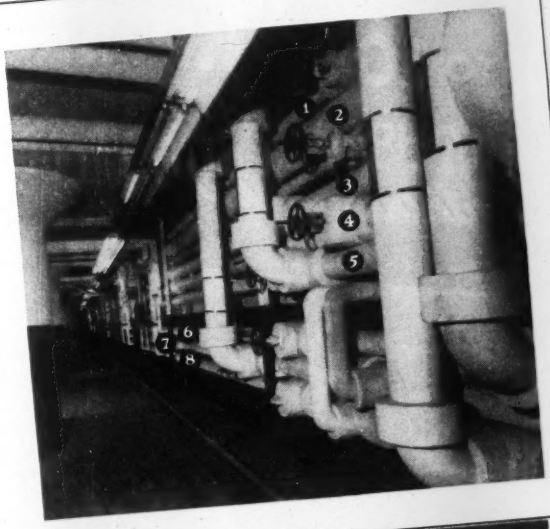
CONTRACT # 51995

COMPANY:
Western Electric Company
Baltimore, Maryland

INSTALLATION:
Pipe lines carrying steam, air, hot and cold water

KEY TO PIPE LINES:

1. 3" 50-lb. steam line Std. Thick 85% Magnesia
2. 6" 300-lb. steam line Dbl. Std. 85% Magnesia
3. 4" 40° water return Light-Duty Cork Covering
4. 4" 40° water supply Light-Duty Cork Covering
5. 4" 200° water return Std. Thick 85% Magnesia
6. 4" 200° water supply Std. Thick 85% Magnesia
7. 4" 200° water return Std. Thick 85% Magnesia
8. 4" 200° water supply Std. Thick 85% Magnesia



A neat job like this is no accident

The neat finished appearance of this maze of nested fittings and close-together pipe runs didn't just happen. It resulted from sound engineering and top-grade workmanship. First, piping was laid out carefully with lines spaced to allow for full insulation thickness at all points. Second, the insulation was applied and finished in a workmanlike manner by the mechanics of Armstrong's contracting organization.

This intricate piping supplies steam, air, hot and cold water to machines that automatically apply rubber insulation to telephone wires. As shown in the key above, steam and hot water lines were insulated with 85% Magnesia. Armstrong's Light-Duty Cork Covering was used on cold water lines. These quality materials, correctly specified and installed according to approved methods, will give years of efficient trouble-free service.

The next time you're in the market for heat insulation work, get in touch with Armstrong Cork Company. We can help you engineer the job, as well as supply good insulating materials and experienced workmen to apply them. Just contact your near-by Armstrong Office or write today to Armstrong Cork Company, 4409 Maple Avenue, Lancaster, Pennsylvania.

Complete Insulation Contract Service

A satisfactory insulation contract is more than a bid on a set of specifications. There are other factors that cannot be written into a proposal but which can largely determine whether or not the agreement will be entirely satisfactory. They include:

1. Financial responsibility — resources to complete the contract despite any unforeseen events.
2. Integrity—a reputation for quality work and for prompt settlement of any justified complaints.
3. Technical ability — experience plus technical and research staff to complete the work in accordance with best practices.
4. Manpower resources — trained supervisors and workmen able to handle any contract efficiently.
5. Efficiency—ability to handle accurately things like accounting, tax provisions, insurance, and workmen's compensation.

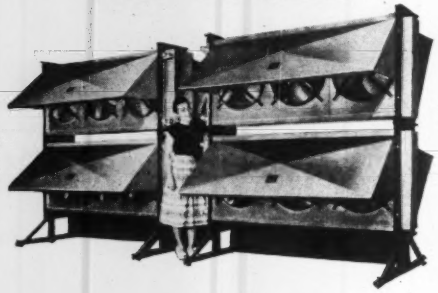
You get all these with an Armstrong Contract

ARMSTRONG'S INDUSTRIAL INSULATIONS

For temperatures up to 2800° F.

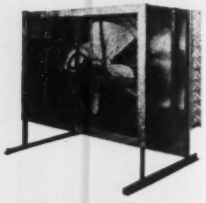
3/4 TO 100 H.P.
CONDENSING
...without water!

ANY SIZE COMPRESSOR
CAN BE
AIR COOLED



with 40 TON

UNICON*
by KRAMER



Eliminates all water problems . . . because you don't use water with UNICON! Stands, hoods and wind deflectors are available for simplified outside mounting.

20 TON

WRITE FOR BULLETIN U-210

*Patent Pending

KRAMER TRENTON CO.
Trenton 5, N.J.

purchasing agent of American Brake Shoe Co. *E. E. REAGLE*, formerly president of Ing-Rich Metal Products Co., East Palestine, Ohio, has joined the technical staff of the sales department of the company's Tubular Products Div. at Beaver Falls, Pa.

ROBERT JOHNSON has been elected president, *THE CYCLONE BLOW PIPE CO.*, Chicago, designer and manufacturer of air conditioning, ventilating, and collecting equipment.

RADIATOR SPECIALTY CO., Charlotte, N.C., has named *GEORGE EINHART*, formerly art director of The Charlotte Observer, as advertising manager.

G. T. VAN ALSTYNE has been appointed director of advertising and publicity, *AIR REDUCTION CO., INC.*, New York. *GEORGE M. WORDEN*, recently with Hill and Knowlton, Inc., public relations counsel, rejoins the company as assistant to the director. *A. V. SCHERER* succeeds Mr. Van Alstyne as advertising manager. He was formerly advertising manager of the Ohio Chemical & Surgical Equipment Co. Div.

KARL D. JAHNKE has been appointed credit manager, and elected assistant secretary-treasurer of *DODGE MFG. CORP.*, Mishawaka, Ind. He had been with the accounting firm of Ernst and Ernst in Chicago.

EDWARD V. VOLLETTE has been named superintendent of the *ARMCO STEEL CORP.* drainage and metal products fabricating plant at Washington Court House, Ohio. He had been shipping planner in the planning and scheduling section.

VIKING AIR CONDITIONING CORP., Cleveland, has appointed two men to fill newly created posts. *WILLIAM J. GOLD*, office manager, is now also assistant to the president. *HERBERT H. KLEIN*, formerly with National Key Co., Cleveland, is the new comptroller. In addition, *THOMAS H. SIMCOX* has been named personnel manager. Formerly, he was with Container Corp. of America.

METAL GOODS CORP. OF HOUSTON, a division of Metal Goods Corp., St. Louis, has appointed *CHARLES G. GRIBBLE, JR.*, as manager of sales. He has been a sales representative for the company.

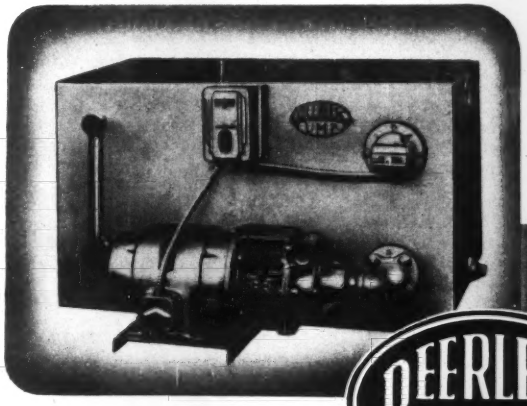
GEORGE McCUSKEY has joined *THE YOUNGSTOWN SHEET AND TUBE CO.*, Youngstown, Ohio, as assistant to the president. He will be primarily concerned with financial phases of the industry.

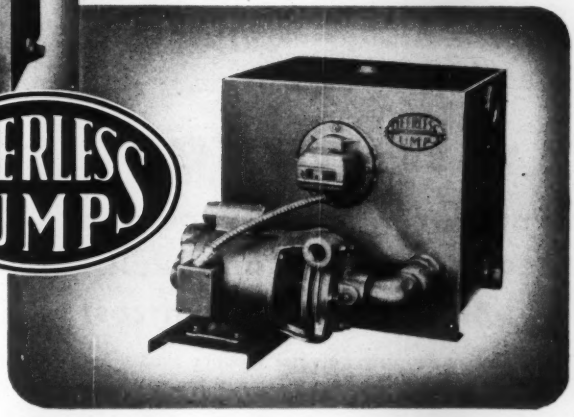
IN THE TERRITORIES . . .

For *INTERNATIONAL OIL BURNER CO.*, St. Louis—*HAJOCA CORP.*, 31st & Walnut Sts., Philadelphia, is distributor of gas and oil furnaces. The distributor has 33 branches from Newark, N.J., to Tampa, Fla. *STANLEY*

BUY THE CONDENSATE RETURN UNITS BUILT BY THE MAKERS OF PEERLESS PUMPS

Your Certification of High Quality, Low Cost and Peak Performance





PEERLESS PUMP

SIMPLEX AND DUPLEX UNITS FOR CAPACITY RANGE OF 1000 TO 100,000 EDR • PRESSURES: 20, 30, 40 LBS.

PEERLESS

CONDENSATE RETURN PUMPS

You can get both highest quality and low cost by insisting on Type PC Peerless units, made by the manufacturer of famous Peerless Pumps.

Peerless quality is quickly evident throughout these condensate receiver units. The pumps that power these units are close-coupled, bronze fitted vertically split case design, proved by Peerless in thousands of installations.

Refinements in design for pumps of this type include the use of stainless steel shaft and a positive-action mechanical shaft seal on all units from ⅓ to 1 h.p. inclusive. Receiver tanks are constructed of heavy gauge, copper bearing steel, accurately welded and pressure tested. No special base plate or foundation is required. Air circulating space is provided between floor and receiver tank, helping to eliminate corrosion due to wet floors.

All Peerless condensate units are furnished complete ready for service. If you want quality with day-after-day economy and dependability, specify and buy Peerless Type PC Condensate Return units. Peerless distributors are located in all principal cities for service and engineering help. A descriptive Bulletin, complete with rating tables and full specifications on all models is available upon request. Write today for Bulletin B-2201.

SPECIFICATIONS

Simplex Units

⅓ and ¾ h.p. at 20 and 30 lbs. discharge pressure with capacity rating of 1,000-10,000 EDR.

Receiver Capacity: 16 gallons.

Simplex and Duplex Units

½-5 h.p. at 20, 30 and 40 lbs. discharge pressure with capacity rating of 10,000-100,000 EDR.

Receiver Capacities: 30-98 gallons.

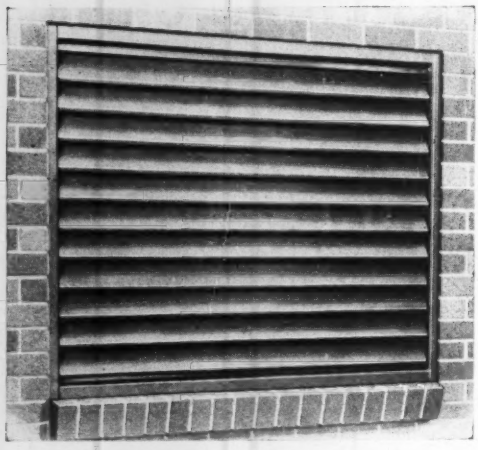
fmc

PEERLESS PUMP

PEERLESS PUMP DIVISION

FOOD MACHINERY AND CHEMICAL CORPORATION

Factories: Los Angeles, California, and Indianapolis, Indiana.
Offices: New York, Atlanta, Fresno, Los Angeles, Chicago, St. Louis, Phoenix, Dallas, Plainview and Lubbock, Texas. Tulsa.



Airlouver

weather-tight louver units tailored to fit any wall opening—*no premium cost*

The conveniently wide size variation available in Airlouvers virtually gives you custom-made equipment at economical standard costs. It's easy to fill any size wall opening with one or more Airlouver units—in either adjustable or fixed types.

These louvers have excellent appearance and high utility. The percentage of free opening area is as large as possible consistent with complete weather-proofness. Strong formed channel frame construction houses overlapping blades. Several methods of operating are optional. Various types of mounting facilities enable you to make the most suitable installation according to building construction. Write for Bulletin 339-H.

Swartwout makes a complete line of gravity and powered roof ventilators to fill every need on any type of industrial, commercial or public building.

18511 Euclid Avenue, Cleveland 12, Ohio

The Swartwout Co.

Roof Ventilators and Ventilating Louvers

POWER PLANT EQUIPMENT • PROCESS INDUSTRY CONTROLS

S. ELLIS has been appointed sales representative to cooperate with the distributor in the New Jersey, eastern Pennsylvania, and Delaware region. *THE WEBSTER CORP.*, 2300 Colley Ave., Norfolk, is representative for the Virginia, North and South Carolina, Georgia and northern Florida regions, and cooperates with the branches in that territory.

For *RELIANCE ELECTRIC & ENGINEERING CO.*, Cleveland—addition of four engineers to various district sales offices. *JAMES McCREA BIGGAR* goes to Cleveland; *BURTON B. FINIGAN*, to New York; *WALTER A. JENSEN*, to Buffalo; and *WILLIAM C. PRETTYMAN*, to the central western office in Chicago.

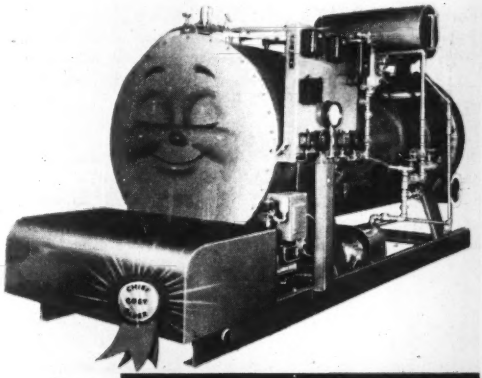
For *FARR CO.*, Los Angeles—*ROBERT S. BEBB* is sales manager, supervising the western division. *JAMES E. MATUSKA*, Seattle, has been named sales manager for the northwest district.

For *MINNEAPOLIS-HONEYWELL REGULATOR CO.*, Minneapolis—three new field engineers in the Transportation Div. *JAMES AYERS* is field engineer in San Francisco; *ANTHONY J. ORLANDO*, in New York; and *JOHN McSWEENEY* in Cleveland. *MILTON EDGRAN* and *ALLEN F. BLANDING* are now application and service engineers in Chicago and New York, respectively. Also for the division, field engineer *W. R. BARNARD* has been transferred from Richmond to Philadelphia, field engineer *K. E. KOZA* from Chicago to St. Louis, and *T. R. WAGNER* from the commercial division to the post of transportation engineer in Minneapolis. In addition, *STEVE TOTH* has been named manager of the Wichita sales and service office of the company. Formerly, he was in the Albany office.

For *WORTHINGTON CORP.*, Harrison, N.J.—*F. E. PELTIER* has been named manager, central regional engineering and service, with offices in Cleveland. The territory includes Detroit, Cleveland, Cincinnati, Buffalo and Pittsburgh.

For *TIMKEN SILENT AUTOMATIC DIV.*, The Timken-Detroit Axle Co., Jackson, Mich.—*RICHARD K. LIGHT* is district sales manager in the southeastern area including North Carolina, Virginia, and part of Maryland. *THOMAS J. CALLAHAN* is district sales manager in part of the New England area, including Rhode Island and parts of Massachusetts and Connecticut. He succeeds *K. O. RALPHS*, recently named regional manager in the Midwest, who has charge of oil and gas heating equipment sales in Wisconsin, Minnesota, North and South Dakota, and metropolitan Chicago.

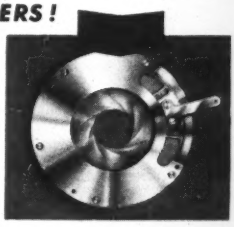
For *ADELTA MFG. CO., INC.*, Philadelphia—three new representatives. *R. J. MILHOLLAND* and *W. F. HIRSCH*, of the *MERCURY SALES CO.*, 228 Empire Bldg., Syracuse, will cover western New York. *RAY WESTLUND, JR.*, 1044 Chapel St., Wentworth Bldg., New Haven, Conn., will cover Maine, New Hampshire, Vermont, Massachusetts and Rhode Island. *PAUL SIMMONS CO.*, 912 Commerce St., Dallas, will cover Texas.

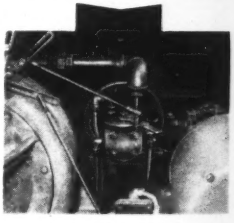


"OUR STEAM-PAK GENERATOR WAS REWARDED FOR CUTTING OUR COSTS $10,000 LAST YEAR"

Modern steam production with York-Shipley Steam-Pak Generators shows unbelievable savings in fuel, maintenance, and installation costs. For instance, an installation in the shops of middle western railroad paid for the installation and saved $10,000 during the first year of operation.

THESE STEAM-PAK *EXCLUSIVES* ARE *REAL COST SAVERS!*





Steam-Paks, the modern steam generators, built by York-Shipley, regulate themselves automatically by load demand, furnishing steam or hot water when required. The Iris Shutter air control (upper right) and Metering Oil Pump (lower right) supply the correct amount of air and oil as required by load demand. This means highest combustion efficiency, lower operating costs. Steam-Paks cover the full range from 15 to 300 hp. for low or high pressure steam or hot water and are fired by oil, gas, or a combination of oil and gas.

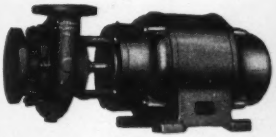
GET YOUR COPY OF THIS MANUAL TODAY!

"Steam in a Package"—a 14 page book which tells the installation and operating advantages of York-Shipley Steam-Pak Generators. Write today for your free copy of Bulletin 201.

YORK-SHIPLEY, INC.

INDUSTRIAL DIVISION, YORK 7, PA.

AUTOMATIC HEAT AND POWER SPECIALISTS SINCE 1918

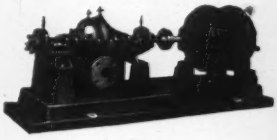


CLOSE-COUPLED PUMPS

A real space-saving design with no sacrifice in durability and efficiency. For clear water, but can be had in special alloys. Bulletin 975-B.

SUMP PUMPS

Self-contained vertical units ready to install. Rugged, trouble-free, with ball bearing thrust and enclosed shaft. Bulletin 963-F.

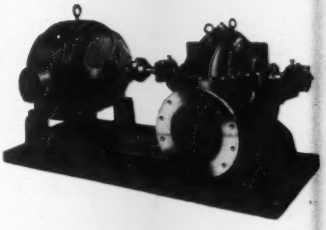


TYPE "RR" PUMPS

For handling clear water, any temperature, at high pressures. Widely used for boiler feed. Rugged, efficient. Bulletin 980-B.

DOUBLE SUCTION PUMPS

For top performance on clear water jobs, including air washers, these are of the finest materials and construction. Bulletin 955-N.



"Buffalo" PUMPS

MEAN MONEY SAVED THROUGH TROUBLE AVOIDED

True economy in pumping is in the pump you can install—and practically forget! "Buffalo" has always built such pumps. First cost may be a few dollars more than the "low-bidder" pump, but careful, sound "Buffalo" design and construction has always paid for itself in (1) longer years on the job, (2) fewer shutdowns, and (3) high efficiency.

As the pictures show, you can pick a "Buffalo" centrifugal pump that's tailor-made for your job. *WRITE FOR BULLETINS!*

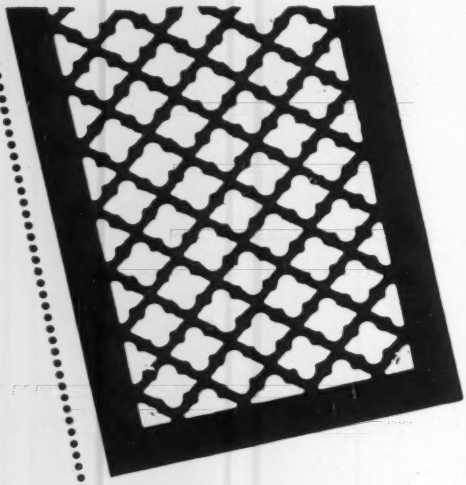
BUFFALO "Buffalo" PUMPS, INC.

171 MORTIMER STREET BUFFALO, N. Y.

Subsidiary of Buffalo Forge Company

Canada Pumps, Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID



Distinctive
perforated metal
Grilles

A grille may be merely utilitarian, or it may also add greatly to the appearance of the room in which it is installed.

Hendrick Perforated Metal Grilles provide ample open area for the passage of air, and at the same time offer a wealth of distinctive designs that makes it easy to select a design which will definitely enhance the attractiveness of any room.

From the mechanical standpoint Hendrick Grilles are unsurpassed. The designs are always clean-cut with no burrs or other imperfections, and a special process in their manufacture makes them uniformly flat and easy to install.

Write for full information.

SEE OUR CATALOG IN SWEET'S

Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
Architectural Grilles
Mitco Open Steel Flooring,
Shur-Site Treads, Armorgrids

HENDRICK
Manufacturing Company
48 DUNDAFF STREET, CARBONDALE, PA.
Sales Offices in Principal Cities

For *CARBIDE AND CARBON CHEMICALS CO.*, division of Union Carbide and Carbon Corp., New York—*J. W. ROSS* is Philadelphia district manager, succeeding *R. M. JOSLIN, JR.*, who is now midwestern division manager in Chicago.

For *DIAMOND IRON WORKS, INC.*, Minneapolis—*CARNEGIE DOCK & FUEL CO.*, Minneapolis, is exclusive northwest distributor for the line of automatic coal heating equipment, covering Minnesota, and North and South Dakota. The sales office is at 1211 East Franklin.

For *AMERICAN WHEELABRATOR & EQUIPMENT CORP.*, Mishawaka, Ind.—*WALTER S. SCHAMEL* is district manager of the Los Angeles office. He has opened new offices at 3155 Leonis Blvd., Vernon.

For *L. J. WING MFG. CO.*, Linden, N.J.—a number of new sales representatives: *EGGELHOF ENGINEERS, INC.*, Tulsa; *EGGELHOF ENGINEERS, INC.*, Houston; *ENGINEERING ASSOCIATES*, Erie, Pa.; *HAWAIIAN EQUIPMENT LTD.*, Honolulu; *GUY MANKIN, JR.*, Kent, Conn.; *PREMIER INDUSTRIAL LTD.*, Edmonton, Alberta, Can.; and *INDUSTRIAL EQUIPMENT CO.*, Orlando, Fla.

For *THE NATIONAL RADIATOR CO.*, Johnstown, Pa. — three new salesmen in the Buffalo branch office: *EDWARD A. OKON, SR.*, covering Buffalo, Olean and Jamestown, N.Y., and Erie, Pa.; *ARTHUR T. POULTON*, covering southeastern New York; and *RICHARD D. TELAAK*, covering the counties of Erie, Niagara, and Genesee, N.Y.

For *THE TRANE CO.*, La Crosse, Wis.—*JOHN H. RENNINGER* has been appointed to the Wilmington, Del., sales office. He was formerly a representative in the Philadelphia area.

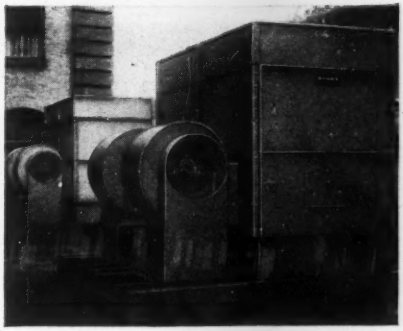
For *RICHMOND RADIATOR CO.*, New York—*LEO J. HAVICAN* is sales representative in the Connecticut and western Massachusetts territories, with headquarters in Connecticut.

For *THE ALLEN-BRADLEY CO.*, Milwaukee — *ROBERT P. SMITH & CO.*, 2031 Hendricks Ave., Jacksonville, Fla., is the new commission agent in Florida.

For *GUSTIN-BACON MFG. CO.*, Kansas City, Mo.—*BALL DISTRIBUTING AND ENGINEERING CO.*, Tulsa, distributor of glass fiber insulation, has expanded its territory to include a warehouse and sales office at 819 N. Olie St., Oklahoma City. *GLENN HUGHES* will be in charge of the branch and *BILL LINIHAN* will be the office manager.

For *FAGEOL HEAT MACHINE CO.*, Detroit—*ROBERT P. KLOECKNER* is sales representative in Illinois,

where conditions demand QUIET water cooling use Binks Blower-Type Towers



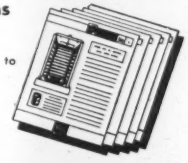
With no more noise than that made by a good domestic refrigerator, Binks Blower-Type Cooling Towers provide circulating water for air conditioning compressors up to 60 tons capacity.

That's why Binks Type 2-B and 2-BB Towers are just what you need for refrigeration and air conditioning systems in hospitals, hotels, private homes, apartment buildings, business establishments and other places where excessive operating noise simply will not be tolerated.

Send for these informative bulletins
describing Binks complete line of mechanical draft cooling towers. No obligation, of course:

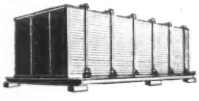
Bulletin 47-A—Types 2-B and 2-BB (capacity ranges, 3 to 60 tons of refrigeration)
Bulletin 33—Type 2-D (1 to 30 tons)
Bulletin 34—Type 2-D, twin fan (50 to 100 tons)
Bulletin 35-A—Type B (3 to 21 tons)
Bulletin 36—Type 2K-S (50 to 220 tons)
Bulletin 39—Type K (333 to 1000 tons)

Write to: Binks Manufacturing Company
3118-38 Carroll Ave., Chicago 12, Ill.



For moving large volumes of air *quietly*, the squirrel cage blowers in Binks Type 2-B and Type 2-BB towers are unsurpassed. By using a multi-bladed rotor at slower speeds, these efficient units insure adequate air movement without the noises that characterize other methods of forced draft cooling.

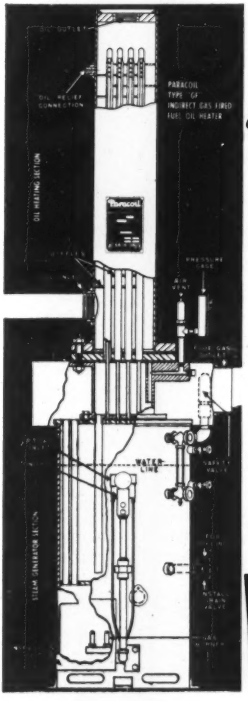
The picture above of Type 2-BB towers on the roof of a commercial building evidences their suitability where quiet operation is essential.



Binks

EVERYTHING FOR WATER COOLING • NATURAL AND MECHANICAL DRAFT COOLING TOWERS • INDUSTRIAL SPRAY NOZZLES

REPRESENTATIVES IN ALL PRINCIPAL CITIES • SEE YOUR CLASSIFIED DIRECTORY



A GREAT NEW DEVELOPMENT IN OIL PREHEATER DESIGN

Paracoil Keeps Pace With The Rapidly Changing Needs Of The Oil Burner Industry

The TYPE "GF" INDIRECT GAS FIRED FUEL OIL HEATER

A RADICALLY NEW APPROACH TO THE PROBLEM OF ADEQUATE OIL PREHEATING UNDER ALL OPERATING CONDITIONS!

The Type "GF" Oil Heater is an integrated self-contained steam vapor generating exchanger using gas as its primary heat source.

However, the gas flame does not come in contact with the tubes containing the fuel oil. Instead, vapor from the lower steam generating section does the actual oil heating!

APPLICABLE TO ALL TYPES OF OIL FIRED APPARATUS!

As it is not dependent upon the unit it is servicing for the means of heating the oil, the Type "GF" Heater can be applied to any oil fired apparatus, be it a steam or hot water boiler, a process oven, a dryer or a kiln!

A COMPLETE SOLUTION TO THE OIL-IN-BOILER PROBLEM!

As the Type "GF" Heater is in no way connected to the steam or water space of any boiler it may be serving, there can be no possible contamination of the boiler heating surfaces in the event of an oil leak in the heater.

CHECK THESE FEATURES!

Completely factory assembled • Easy to install anywhere, even outdoors • Requires only minimum of floor space • Economical to operate • Wide range of oil heating capacities • Burns any specified type of gas fuel • High oil temperatures at all times • Operation unaffected by normal variation in viscosities of oils being heated • Reduces oil consumption through improved fuel combustion.

THE PERFECT HEATER FOR:

- Low temperature forced hot water heating systems on No. 6 oil.
- Plants with starting difficulties after week end shutdowns.
- Supplementing inadequacies in present oil preheating systems.

Approved by Board of Standards and Appeals, City of New York—Cal. No. 362-51SA

BULLETIN 60-L
WRITE FOR YOUR COPY TODAY!

DAVIS ENGINEERING
CORPORATION
30 ROCKEFELLER PLAZA, NEW YORK 20, NEW YORK • 1064 EAST GRAND STREET, ELIZABETH 4, NEW JERSEY

FOR COAL AND ORE THAWING SHEDS

many

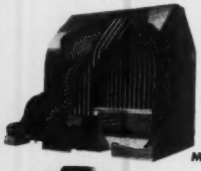
RAILROADS

specify LEE

Lee Direct-Fired Heaters have efficiently serviced Thawing Sheds for 30 years giving trouble-free operation.

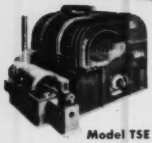
The skill, integrity and responsibility of the entire Lee Corporation is your guarantee of sound engineering.

We maintain a Staff of Engineers to give you complete Lee engineering service and who will furnish data to suit your needs, promptly upon request.



Model UTH

THERE'S NO HEATING OR AIR-REPLACEMENT PROJECT TOO LARGE FOR LEE HEATERS



Model TSE

Model BST

LEAN TO LEE . . . *Specify Lee*

Complete engineering data on request

Representives in all principal cities

SPECIFY LEE the completely engineered heater

LEE CORPORATION

1011 TATNALL STREET, WILMINGTON, DELAWARE

BALTIMORE, MD. CHICAGO, ILL.

Wisconsin and Minnesota, with headquarters in Chicago. *J. DANIEL JOHNSON* is representative in eastern New York, eastern Pennsylvania, Connecticut, Massachusetts, and New Jersey, with headquarters in Pleasant Valley, New York.

For *THE YOUNGSTOWN SHEET AND TUBE CO.*, Youngstown, Ohio—two promotions in the Chicago district sales office. *RODNEY V. NILSSON*, formerly in tin plate sales, is now manager of that department. *R. PAUL BROADHURST*, a member of the Chicago district sales staff for two years, is now assistant district sales manager for the Chicago territory.

For *THE SAWHILL MFG. CO.*, Sharon, Pa.—two new district sales managers. *D. M. MIDDLETON* is manager in the new sales office at 905 Wheel St., Springfield, Ohio, covering western and southern Ohio, southern Indiana and Kentucky. *F. D. HAMLIN* is manager for the territory including eastern and northern Ohio, western Pennsylvania, West Virginia, and the western part of Virginia.

For *S. T. JOHNSON CO.*, Philadelphia—*H. LIEBLICH & CO., INC.*, New York, is exclusive representative in northern New Jersey and Long Island. These areas have been added to the company's regular territory of New York City.

For *BUILDERS-PROVIDENCE, INC.*, and *OMEGA MACHINE CO.*, Providence—new company offices have been opened in Room 207, Congress Bldg., 3527 Broadway, Kansas City, Mo. *RAY W. LINDSEY* will head the new midwest office as sales manager.

For *BUSH MFG. CO.*, West Hartford, Conn., and the *HEAT-X-CHANGER CO.*, Brewster, N.Y.—two additional representatives for the west coast division. *O. M. BUTLER* will be in San Francisco, and *IRA W. WOLCHIN* is in Los Angeles as a sales engineer. *JOHN SHEPERDSON* has been transferred from the post of application engineer, to that of sales engineer in the Chicago office. He will cover the southern Illinois and northern Indiana area.

For *ACRO MFG. CO.*, Columbus, Ohio—*TOM SMITH* is sales engineer covering western Pennsylvania and New York, with headquarters at 17 Jarvis Court, Pittsburgh. *GORDON COLLINS* is sales engineer with headquarters in the Chicago office.

For *RAYTHEON MFG. CO.*, Waltham, Mass.—*GEORGE J. ZIPF* is manager in charge of sales and service for the Chicago district, which covers Indiana, western Kentucky, Wisconsin, Illinois, Minnesota, Iowa, Missouri, North and South Dakota, Nebraska and Kansas.

For *A. O. SMITH CORP.*, Milwaukee—*JOHN J. REDMON* is manager of the product service branch at Dallas, succeeding *BEN HEALD* who is returning to full time sales activity for the company.

WEBSTER KINETIC* BURNER

For Low Pressure Gas

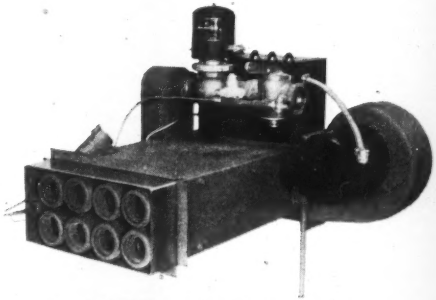
The Webster Kinetic consists of a multiplicity of full venturi mixers with flame retention nozzles. These are assembled in a metal casing complete with pilot and louvre. It may be used with natural, mixed or liquefied petroleum gases. Standby oil burners may be used when desired. As a multiple head assembly it is available in 25 standard sizes of from 4 heads to 48 heads, and can be supplied in any size or shape. Natural gas input ratings from 560,000 Btu/hr to 6,720,000 Btu/hr at 4" wc.

For complete information request Series B8 Bulletins.

WEBSTER DYNETIC*

Forced Draft

GAS BURNER



The WEBSTER DYNETIC Gas Burner consists of multiple venturi tubes with heat resistant alloy, flame retention nozzles assembled in a metal housing and equipped with an electrically driven blower to furnish all of the air for combustion.

All of the valves and controls required for safe, automatic operation, except for thermostat and limit controls, are incorporated in the assembly and wired and tested at the factory. The motor driving the blower is equipped with a centrifugal switch to prevent main gas valve operation unless the blower is functioning.

The burner is available in six sizes for natural gas.

*TRADEMARK

The WEBSTER ENGINEERING COMPANY

TULSA, OKLAHOMA

Division of SURFACE COMBUSTION CORPORATION, Toledo, Ohio

SAVE HOURS, CUT COSTS

ON YOUR PIPING JOBS WITH

GREENLEE PIPE PUSHER

Here's the quick, simple way to install underground pipe. With a GREENLEE Hydraulic Pipe Pusher *one man* pushes pipe *under* streets, walks, tracks, lawns, floors and other obstacles. Cuts job time to a fraction . . . no costly tearing up of paving . . . eliminates extensive ditching, as just a short trench accommodates the Pusher. No tedious tunneling, back-filling, tamping or re-paving. Greatly reduce job time, reduce costs with the GREENLEE which often pays for itself on the first few jobs. Compact, portable, powerful. Get facts today.

Two sizes to fit the exact needs of yours jobs: No. 790, at left, for ¾ to 4-inch pipe. 6,500 to 40,000 lbs. pushing power. No. 795, lower left, for pipe larger than 4-inch, concrete sewer pipe, large drainage ducts. 25,000 to 150,000 lbs. pushing power. Power pump at right for extra ease and speed of operation.

TOOLS FOR CRAFTSMEN

GREENLEE

Greenlee timesaving tools for plumbing and heating work . . . Hydraulic Pipe Benders • Tubing Benders • Hydraulic Pipe Pushers • Pipe Bits • Auger Bits • Spiral Screwdrivers • Chisels and Many More. Write for details. Greenlee Tool Co., 2349 Twelfth Street, Rockford, Illinois.

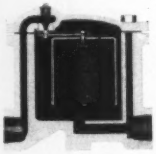
Clark CONTROLS
CAN SAVE YOU MONEY
All Down the Line:

If dollars are running through your steam lines it's time Clark Controls took over. Water in steam lines wastes fuel, cuts efficiency and adds greatly to maintenance costs.

Clark Steam Traps, with Duo-Stop Leverage, drain *twice* the condensate of ordinary traps. Clark Controls on your lines is truly like money in the bank. Write us for full details.

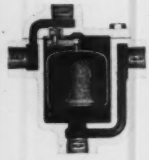
QUICK CLEANING STRAINERS

Remove dirt, scale and grit from steam, fluid and gas lines. Sizes ½" to 3" P.S.I.



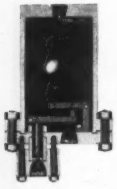
SERIES "70" Inverted Bucket Trap

One of the most popular in the Clark line. Continuous flow capacities up to 2600 lbs. per hour. Sizes ½", ¾" and 1". Pressures up to 200 P.S.I.



SERIES "60" Inverted Bucket Trap

Choice of horizontal or vertical inlet or outlet. For pressures up to 150 P.S.I. "Clark-loy" guided disc and seat.



SERIES "450"

For continuous flow drainage. Pressures up to 600 P.S.I. Sizes ½" to 2". External discharge valve; "Clark-loy" disc and seat.

THE Clark MANUFACTURING COMPANY
THE HOME OF DUO STEP LEVERAGE
1830 E. 38th St. • CLEVELAND 14, OHIO

MEETINGS & CONVENTIONS

CENTENNIAL OF ENGINEERING — September 3 to 13, 57th St. & South Shore Drive, Chicago 37. Major meetings cover 12 broad fields. Among the papers to be presented in Section X (energy), September 11 and 12, Conrad Hilton Hotel, are:

District Steam Heating, by the following past presidents of the National District Heating Association: Ernest E. Dubry, Robert L. Fitzgerald, William A. Herr, Robert D. Martin, Leonard S. Phillips, J. Earl Seiter, Glen D. Winans; presented by A. R. Mumford, (10:00 a.m., Sept. 12).

Warmth for Comfort, by Maria Telkes, M.I.T.

Among the papers to be presented at Section XI (health and human engineering), September 11, La Salle Hotel Ballroom, is:

Engineering Control of Man's Physiological Environment, by Craig L. Taylor, U. of California.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, 29 W. 39th St., New York 18 — Fall meeting, September 8 to 11, Hotel Sheraton, Chicago. It coincides with the latter part of the Centennial of Engineering.

INSTRUMENT SOCIETY OF AMERICA, 1319 Allegheny Ave., Pittsburgh 33 — Seventh national instrument conference and exhibit, September 8 to 12, Cleveland.

Papers to be presented on September 11 include:

Controls as Applied to the Carrier Conduit System, by L. Avery
Aircraft Cabin Temperature Control Systems, by S. D. Browne
Automatic Control System for an All-Year Air Conditioner, by H. C. Shagaloff
Controlling Domestic Oil-Fired Heating Equipment, by C. F. Suesserott

The Fourth Preconference ISA Instrument Maintenance Clinic will be operated during September 5 to 7, prior to the regular conference. The program will include such subjects as thermal elements, pressure and primary flow elements, pneumatic positioning devices, etc.

The clinic of the analysis instrumentation committee, consisting of a lecture and demonstration course on complex analytical instruments, will be held in conjunction with the main meeting, September 8 to 12. Admission is by previous registration, forms for which may be obtained by writing Dr. Axel H. Peterson, Mellon Institute, 4400 Fifth Ave., Pittsburgh 13.

The society's national conference and exhibit will be held September 21 to 25, 1953, Chicago, and the first international instrument congress and exhibit will be held September 14 to 24, 1954, in conjunction with the ninth national conference and exhibit.

IBR SCHOOL OF MODERN HEATING — September 9 to 11, American Legion Memorial Hall, 401 W. Lafayette St., Detroit; September 16 to 18, Bancroft Hotel, Genesee and Washington, Saginaw, Mich.; September 23 to 25, Central Branch YMCA, 1110 Jefferson Ave., Toledo; September 30 to October 2, Erie, Pa. Sponsored by The Institute of Boiler and Radiator Manufacturers, 60 E. 42nd St., New York 17. The school is a three day course providing instruction in the design and installation of hot water and steam heating systems.

SIXTH SHORT COURSE IN HOT WATER AND STEAM HEATING — September 9 to 11, Urbana, Ill. Sponsored by the University of Illinois in cooperation with

New York apartments reduce operating costs with Perfex Industrial Instruments

Hudson View Apartments, Bronx, New York

Typical panel board installed with each boiler unit.

Perfex Industrial Instruments

- **conserve fuel**
- **reduce smoke**
- **save operator's time**
- **increase life of boiler and burner**

Write for your free bulletin for gas, oil or stoker-fired equipment.

PERFEX INDUSTRIAL INSTRUMENTS

PERFEX CORPORATION, MILWAUKEE, WISCONSIN
In Canada
Perfex Controls, Ltd., Guelph & Toronto

Manufacturers' Agents

Are you interested in securing additional lines?

We are occasionally asked by our manufacturer advertisers to suggest the names of manufacturers' agents in various sections of the country whom they can contact in regard to representation of their heating, piping and air conditioning.

If you would like your name listed on our records for inquiries we may receive on your territory, we invite you to write us. There is no charge in connection with this service.

Heating Piping & Air Conditioning

6 N. Michigan Ave. Chicago 2, Ill.

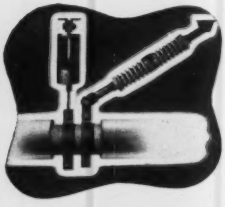
It helps to have the Right Answers!

High temperature, high pressure Piping Installations required in modern power plants make it imperative to carefully calculate the loads they will carry and the supports required. *All* of the problems involved can be solved by correctly allocating

BLAW-KNOX PIPE HANGERS

and Vibration Eliminators in accordance with data made available by the Power Piping Division. Many hours of "spec" time can be saved by reference to the Blaw-Knox line of *standardized* hangers and assemblies, together with Flex-Anal Charts for further guidance . . . as any engineer (or schoolboy) will tell you—"It helps to have the right answers."

BLAW-KNOX CONSTRUCTION CO.
Power Piping & Sprinkler Division
Pittsburgh 33, Pa.



CATALOG NO. 51 *is of equal value whether you are planning a new piping installation or wish to correct the faults of an existing one. Please request it on your letterhead.*

BLAW-KNOX PIONEERS IN THE DEVELOPMENT OF
FUNCTIONAL HANGERS
VIBRATION ELIMINATORS

The Institute of Boiler and Radiator Manufacturers. Among subjects covered will be heating and ventilation load estimates, panel heating and snow removal application, heating unit selection and application, etc. Further information may be obtained from Robert K. Newton, Supervisor, Engineering Extension, University of Illinois, 715 Wright St., Champaign.

SEVENTH NATIONAL CHEMICAL EXPOSITION— September 9 to 13, Coliseum, Chicago. Sponsored by the Chicago Section of the American Chemical Society, 86 E. Randolph St., Chicago 1. An exhibit on atomic energy in industry will be part of the exposition.

SOUTH CENTRAL REGION, NATIONAL ASSOCIATION OF CORROSION ENGINEERS, 1061 M & M Bldg., Houston 2 — October 1 to 3, New Orleans.

AMERICAN INSTITUTE OF WHOLESALE PLUMBING AND HEATING SUPPLY ASSOCIATIONS, INC.— First national convention, October 19 to 22, Chalfonte-Haddon Hall Hotel, Atlantic City, N.J. For further information write G. T. Underwood, executive secretary, Room 402, Albee Bldg., 15th and G Sts., Washington, D.C.

40th NATIONAL SAFETY CONGRESS AND EXPOSITION — October 20 to 24, Chicago. Sponsored by the National Safety Council, 425 N. Michigan Ave., Chicago.

AMERICAN GAS ASSOCIATION, 420 Lexington Ave., New York 17 — 34th annual convention, October 27 to 30, Atlantic City, N.J. An exhibit by the Gas Appliance Manufacturers Association will be held concurrently.

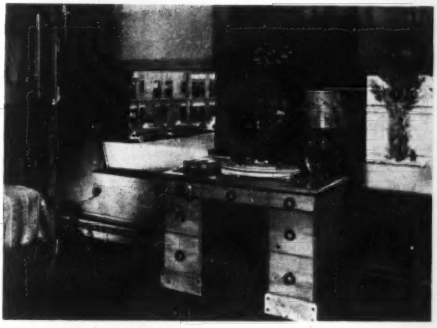
AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, 40 W. 40th St., New York 18 — 38th annual meeting, November 30 to December 3, Hotel Commodore, New York.

20th NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING — December 1 to 6, Grand Central Palace, New York. Management of the show is the International Exposition Co., Grand Central Palace, New York 17. It is held under the auspices of the American Society of Mechanical Engineers, whose annual meeting will be in session during the same week.

NATIONAL WARM AIR HEATING AND AIR CONDITIONING ASSOCIATION, 145 Public Square, Cleveland 14 — 39th annual convention, December 3 and 4, Sheraton Gibson Hotel, Cincinnati.

10th REFRIGERATION AND AIR CONDITIONING EDUCATIONAL EXHIBIT AND CONFERENCE — December 5 to 7, Miami. Sponsored by the Refrigeration Equipment Manufacturers Association, 1346 Connecticut Ave., N.W., Washington 6, D. C. Annual meetings of the Refrigeration Service Engineers Society and the Refrigeration and Air Conditioning Contractors Association will be held in Miami at the same time, followed by a joint meeting of the manufacturers and wholesalers on December 8 and 9, Hollywood Beach, Fla.

AUTO-RAD RADIATION

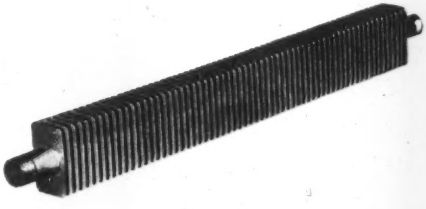


designed with *you* in mind

AUTORAD Baseboard Radiation with its highly efficient finned pipe design is a boon to the contractor. Three outstanding advantages make it the most satisfactory and profitable system for home and industrial heating.

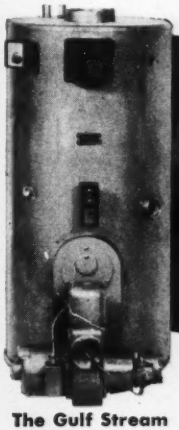
- It provides efficient, economical heating surface for two-pipe steam or hot water systems.
- It is available in random lengths for easy installation on new or remodeled jobs with minimum on-the-job fitting.
- It satisfies the property owner because it is beautiful in appearance, interferes in no way with furniture arrangement and gives years of carefree service.

On your next heating job sell AUTORAD and earn a clean and handsome profit.



AUTORAD, INC.

3535 W. Fillmore St., Chicago 24, Ill.



THE **NEW** ALDRICH *Gulf Stream* C-SERIES BOILER-BURNERS

Designed, Sized, Rated and Priced For Today's Low-Cost Housing Market

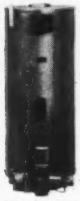
Aldrich produced this new line to meet today's urgent need: quality boiler-burners at a quantity price. Here is compact hot water heating with a saving of dollars, critical materials, space and installation time.

They meet the ASME code; they are designed for standardized production. Five separate sizes, with SBI net ratings ranging from 440 to 1120 square feet of water radiation.

Investigate this new line today. You'll find it profitable to sell, easy to install, economical to use.

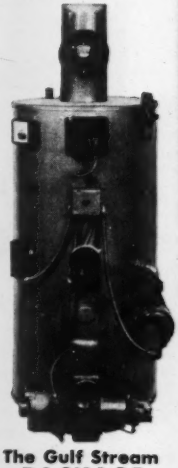
The Gulf Stream STANDARD

Shipped fully erected, with complete set of automatic controls: stack switch, thermostat and limit control.



HOT WATER HEATERS

Available as internally galvanized, high-delivery hot water heater. Five sizes, with output from 100 to 255 GPH at 100° rise. Instant, steady supply of hot water for larger homes, motels, commercial units.



The Gulf Stream PACKAGE

Fully erected package, pre-wired, accessory equipped, ready to set in place and connect.

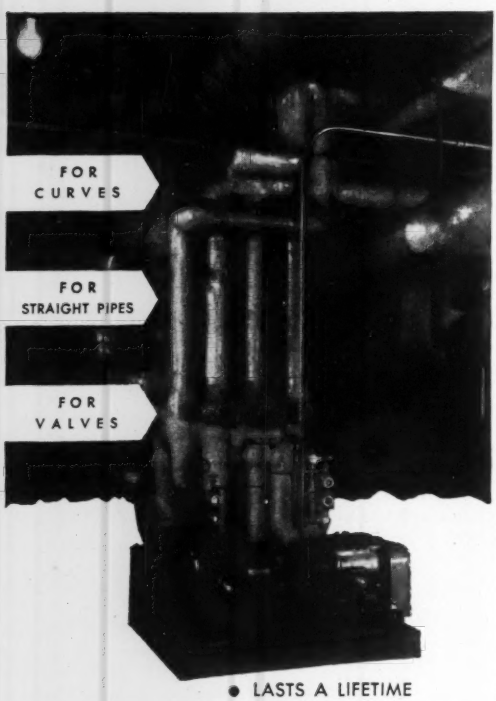
FEATURES

- Multiple flue tubes baffled for maximum heat extraction
- High combustion efficiency
- Fast action
- Instant hot water from tankless hot water coil
- Aldrich burners coordinated to Gulf Stream boilers
- For inspection and maintenance — readily removable top jacket and large opening to combustion chamber
- Burners U.L. listed

For full details, **write or wire**

ANOTHER BREEZE MARK PRODUCT

ALDRICH COMPANY
Wyoming, Illinois



- LASTS A LIFETIME
- EASILY INSTALLED
- APPLIES WITHOUT WASTE

for Maximum Efficiency

SPECIFY ALL-HAIR

OZITE

INSULATING FELT

OZITE All-Hair Felt has been the best insulation for the refrigeration industry for over half a century. Here's why —

. . . low conductivity provides efficient heat barrier . . . allows close temperature control . . . permits maximum capacity of refrigeration units . . . reduces power consumption . . . does not rot or pack down — resists fire.

For all of the facts about time-proven OZITE send for 4-page Bulletin No. 300.

AMERICAN HAIR & FELT COMPANY
Dept. C29, Merchandise Mart
Chicago 54, Illinois

how flexible CAN YOU GET!

WITH EXPANSION JOINTS IT'S Badger

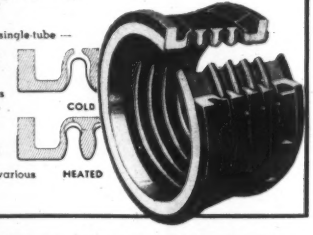
In the national pastime there are new stars every year — but when it comes to expansion joints Badger is a consistent leader in the field year in and year out.

The built-in flexibility and long life of Badger Expansion Joints assures protection against damage to equipment by absorbing the expansion and contraction in piping due to temperature changes.

D-F S-E Directed-Flexing Self-Equalizing: an exclusive feature of Badger Expansion Joints. The flexing of the corrugations is progressively directed over each segment of each of the all-curve corrugations by correspondingly shaped self-equalizing rings. Localized stresses are eliminated insuring a more flexible longer lasting joint.

Buy Badger Joints and you get flexibility, D-F S-E and these features:

- Packless . . . pressure-tight single-tube — requires no maintenance
- Compact . . . approximately the size of flanged fitting
- Special forming . . . no structure-weakening stresses
- Controlled heat treating . . . assures long life
- Wide range of traverse — pressure — temperature Fabricated from deoxidized copper, stainless steel and special alloys to meet various operating conditions.



BADGER MANUFACTURING COMPANY

Original and Sole Manufacturer of Badger Expansion Joints

230 BENT STREET • CAMBRIDGE • MASS.

PLANT MAINTENANCE CONFERENCE AND SHOW — January 19 to 22, 1953, Public Auditorium, Cleveland. Management of the show is Clapp & Poliak, Inc., 341 Madison Ave., New York 17.

NATIONAL HEATING WHOLESALERS ASSOCIATION, INC., 637 Union Commerce Bldg., Cleveland 14 — The annual meeting, January 26 to 28, Congress Hotel, Chicago.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, 62 Worth St., New York 13 — 59th annual meeting, January 26 to 29, Conrad Hilton Hotel, Chicago.

11th INTERNATIONAL HEATING & VENTILATING EXPOSITION — THE AIR CONDITIONING EXPOSITION — January 26 to 30, 1953, International Amphitheatre, Chicago. Held under the auspices of The American Society of Heating and Ventilating Engineers. Address inquiries to the exposition management, International Exposition Co., Inc., Grand Central Palace, New York 17.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, 1061 M & M Bldg., Houston 2. — Conference and exhibition, March 16 to 20.

Engineering Fundamentals

Handbook of Engineering Fundamentals, a one-volume reference for those in all fields of engineering, edited by Ovid W. Eshbach, Dean, Northwestern Technological Institute, has now been published in a second edition. The chapter on engineering thermodynamics now includes a table of the properties of dry air, and in many other chapters material has been expanded, changed and brought up to date. Chapters cover mathematical and physical tables; mathematics; physical units and standards; mechanics of rigid bodies; mechanics of deformable bodies; mechanics of compressible fluids; aerodynamics; electricity and magnetism; radiation; light and acoustics; chemistry; metallic materials; non-metallic materials; and engineering law.

This 1322 page volume is available from the publisher, John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, at $10.00 a copy.

Fuel Cost and Coal Consumption Calculator

Bituminous Coal Research, Inc., has developed a slide calculator for use by coal company salesmen and engineers, and by personnel of coal-burning plants. One side permits fuel-cost calculations. The reverse side is used to compute coal consumption from boiler outputs for commercial and small plants, regardless of whether such outputs are expressed in pounds of steam, boiler horsepower, millions of Btu, or equivalent direct radiation. One setting for coal of a given Btu and specific delivered cost shows the cost at which any other fuel must be provided to give the same cost per million Btu in the fuel. A scale allows for efficiency to be taken into account.

The calculator is available from Bituminous Coal Research, Inc., 2609 First National Bank Bldg., Pittsburgh 22, at 50 cents each (30 cents for members).

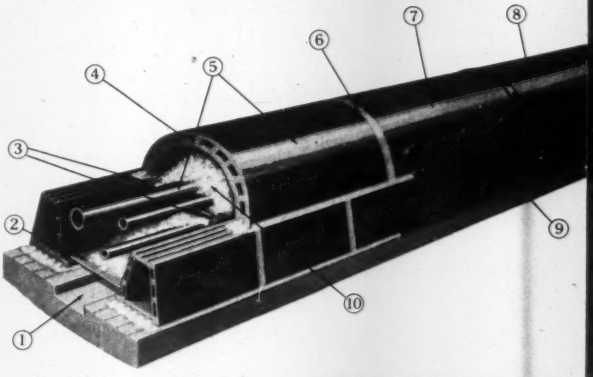
OUTSTANDING

Therm-O-Tile

REG. U.S. PAT. OFF.

Underground Steam Conduit

FEATURES



1. Drainage is entirely internal. No external drain required. Permanently dry insulation and insulation space assured.
2. Asbestos separator plate. Supports the filler insulation. Not needed when sectional insulation is used.
3. Cast iron adjustable pipe supports. 12 ft. centers. Rest on solid concrete base.
4. Sealed air channels. Increase efficiency.
5. Piping and conduit are independently supported. No strain on joints of conduit when lines are expanding in service.
6. Waterproof mortar interlocks in channels and seals joints. Smooth exterior results.
7. Arched construction. Tests prove greater strength than required by A.S.T.M.
8. Conduit may be opened for pipe repair without renewal of parts.
9. Rigid 4-inch concrete base poured directly into the trench bottom. No broken stone fill. No underdrain. Provides convenient "sidewalk" for pipe workers.
10. This view shows "filler type" insulation. Bulletin 511 gives complete details concerning both types — filler and sectional pipe covering.

FIRST COST IS COMPETITIVE

In spite of the above superior features, Therm-O-Tile is competitive in total first cost.

JOHNS-MANVILLE SERVICE UNITS

Therm-O-Tile is represented by Johns-Manville Technical Service Units in all principal cities.

BULLETIN 511 TELLS ALL

Ask for a copy. It gives complete construction details, uses, and shows typical installations.

H. W. PORTER & CO., INC.

822-H Frelinghuysen Avenue • Newark 5, N. J.

REID HAYDEN, INC.

BALTIMORE, MD. RICHMOND, VA. CHARLOTTE, N. C.

Insulation Engineers & Contractors

NEW BOOKS & REPORTS

Air Pollution Conference Proceedings

Air Pollution—Proceedings of the United States Technical Conference on Air Pollution contains all the papers and written discussion which were presented at the huge conference on air pollution held in Washington, D. C., May 3 through 5, 1950. The conference, of which Louis C. McCabe was chairman, was sponsored jointly by several governmental agencies, and was attended by nearly 800 people. Since the broad subject of air pollution has many aspects, the material was presented at the conference at seven different meetings which ran concurrently. These divisions or panels are Agriculture, Analytical Methods and Properties, Equipment, Health, Instrumentation, Legislation, and Meteorology. The papers are divided similarly in the book, which is arranged in seven parts. It is impossible to give an adequate review of a book of this size in a reasonable amount of space. Little more can be done than to make a few observations.

Fourteen papers were given on the subject of agriculture, and 110 pages of the book are devoted to it. Fluorine and sulfur products are emphasized as of major importance in their effects on vegetation.

Fourteen papers covering 94 pages were given on the subject of analytic methods and properties. Analytical procedures in measuring atmospheric pollutants include both chemical and physical methods. Because the amounts present in the air of even grossly polluted areas are extremely small, micro-techniques are needed for evaluation.

To readers of HPAC, the section on equipment is of the greatest interest. Twenty-four papers were presented at the equipment panel meetings, and 208 pages of the book are devoted to them. The papers cover the subject rather completely and contain much useful information on air cleaners, including odor control, and on dust collectors as well as on control of smoke and fly-ash from power plants and railroads. All the common types of dust collectors and gas scrubbers are discussed in this section of the book.

The papers given in the section on health do not settle the obvious question, "Does air pollution constitute a health hazard?" In fact, they merely emphasize the great lack of knowledge — the many unknowns — in the field. While there are those who contend that the degree of pollution normally existing in an industrial city does affect adversely the health of some of the residents, proof to this effect is either wholly lacking or far from convincing. This section of 80 pages contains 14 papers.

The subject matter of the instrumentation section is differentiated from that in the section on analytical methods and properties largely on the basis of whether the operation is carried out in the field and has to do primarily with sampling or whether it is done in the laboratory and concerns the measurement of the amount and kind of material in a sample. In the case of direct reading or recording instruments, such as are available for some few pollutants, both the sampling and the measurement of the amount of contaminant are done in the field. This section contains 14 papers and covers 154 pages.

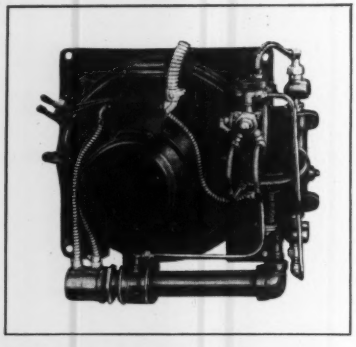
Like health, legislation is a controversial subject. The controversy centers around the type of legislation that

For the **BIG** *heating jobs...*

there's nothing to equal the world famous

JOHNSON 30 AVH

PERFECT for HOTELS, HOSPITALS, OFFICE BUILDINGS
***and countless other* HEAVY DUTY HEATING JOBS**



Johnson's time-tested 30 AVH Burner uses preheated heavy oils that keep fuel bills low. It is built in six sizes and capacities to meet virtually any heavy-duty heating need.

For all around efficiency and fuel economy, the Johnson 30 AVH has never been surpassed. Heating Engineers all over the world have learned from actual experience that they can depend on 30 AVH performance. Probably more big buildings have been heated for more years by 30 AVH Burners than by any other single oil burner model ever built. With complete confidence, we recommend it for your consideration on any heavy-duty job.

If the 30 AVH doesn't fit your specifications, there are other fine Johnson Burners that will. For the Johnson line-up is a *complete* line-up; small "packaged" domestic heating units . . . water heaters of every size . . . air, steam and hot water units . . . and a wide assortment of heavy-duty burners. Tell us what you need. We can supply it, and we'll be glad to help.

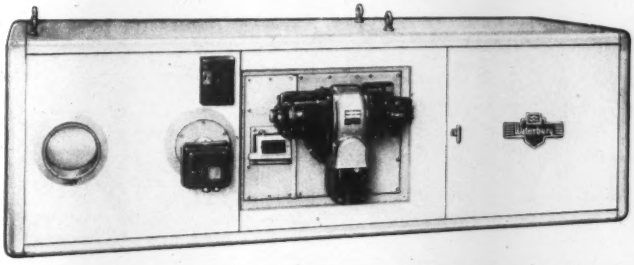
There's a Johnson Oil Burner for every heating need

Johnson Oil Burners

S. T. JOHNSON CO.
940 Arlington Ave., Oakland 8, Calif.
401 No. Broad St., Philadelphia 8, Pa.

FOR UNUSUAL INSTALLATIONS

A special unit is needed in situations where floor space is at a premium. This need has been met very successfully in the latest addition to the Waterbury line.



Waterbury

Oil-Fired, Forced Warm Air SUSPENDED FURNACE

4 Sizes: 84,000 to 168,000 B.T.U. Output

Commercial buildings, industrial plants, and certain types of homes require a warm air heating plant with the qualities of the Waterbury suspended furnace. A real space saver, it can be suspended in a crawl space under the floor, from the basement ceiling, in the attic, or in any portion of the building where more space is readily available at ceiling level than on the floor.

A "package" unit, assembled at the factory, the Waterbury suspended furnaces has all parts accessible from the front, for easy inspection, cleaning and servicing. Air filters and a large capacity blower are standard equipment. Deserves serious consideration by owners, builders and men concerned with the maintenance of service stations and other commercial or industrial buildings.

Waterbury manufactures a complete line of furnaces and winter air conditioners, with a unit for every size home and every type of fuel.

The Waterman-Waterbury Co.
OVER 45 YEARS OF WARM AIR HEATING
1152 Jackson St., N.E., Minneapolis 13, Minn.

ALWAYS IN THE AIR CONDITIONING PICTURE

This one serves the air conditioning system of a large office building in the southwest. Others of all kinds in refrigeration, power, petroleum and natural gas installations throughout the country. Get UNITED proposals before you buy. Write for Bulletin No. 50.

UNITED COOLING TOWER COMPANY

4022 Broadway, Kansas City 2, Mo. **Plant: Pilot Point, Texas**

Authorized Representatives in Principal Cities

WHY WASTE WIND POWER:

A assured performance

B bearings—guaranteed

C cost—low

D delivery—immediate

The *WESTERN ROTARY* ventilator continues to exhaust during wind lulls by kinetic energy.

Lifetime guaranteed bearings—bearings that stay in alignment. Both bearings mounted on same axis. Long-lasting metallic-leafing paint finish on durable galvanized steel. Clean, low modern silhouette, completely functional. Throat sizes 6" thru 48" . . .Order today from your wholesaler. Write for prices, specifications, other information. In 1952 Sweet's, A.E.C., Heating, Ventilating & Air Conditioning Guide.

"always on the job—never on the payroll"

WESTERN ENGINEERING & MFG. CO.

672 SOUTH LAFAYETTE AVE., VENICE, CALIFORNIA

NOW is the time to consider

SNOW MELTING

Systems around Buildings and Grounds

Better send at once for our SNOW MELTING MANUAL. Here are design data based on a study of—and others' actual experience with over 100 snow melting systems of all kinds for

- LOADING PLATFORMS and DOCKS
- SIDEWALKS • ROADS • DRIVEWAYS
- MARQUEES • PARKING AREAS
- RUNWAYS • RAILWAY SWITCHES

and other applications which HAVE proved that this modern method of snow removal

Costs No More Than Other Methods

—and because snow melting by pipe coils has other distinct advantages, such as dirt-free sidewalks and entrances, and the complete elimination of ice surfaces, the demand for this method of snow removal is swiftly growing.

Complete information on the correct design, installation and operation of snow melting systems is offered in the new SNOW MELTING MANUAL, a reprint of articles originally published in HEATING, PIPING & AIR CONDITIONING.

$1.00 will bring you this SNOW MELTING MANUAL . . . a valuable addition to your file on business opportunities.

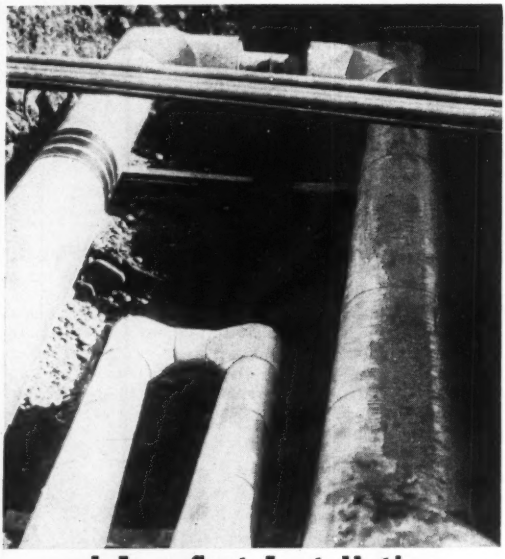
Heating, Piping & Air Conditioning

6 North Michigan Avenue **Chicago 2, Illinois**

D.I.P.

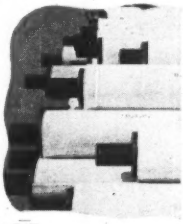
REG. U. S. PAT. OFF.

Pre-Sealed Protection Built-In at Factory



- and Low Cost Installation Saves Time, Trouble and Work

Wherever you have a problem of conveyance of hot-water, steam or refrigerants, you can specify DURANT INSULATED PIPE with complete confidence in securing long range economy.



The combination of the best quality moulded insulation completely protected by non-porous asphalt merits the preference of architects, engineers, and contractors who have investigated the scientifically engineered construction methods employed in the fabrication of D. I. P.

Economy starts with installation. D. I. P. requires no tile, masonry, or sub-drains. Field joint work is simple, yet corrosion and electrolysis are eliminated. Low maintenance costs result in further economy over long years of dependable service.

Complete detailed information and engineering data on standard piping and special fittings will be furnished on request. Our representatives in principal cities are at your service.

PRE SEALED

REG. U. S. PAT. OFF.

WESTERN DIVISION:	EASTERN DIVISION:
DURANT INSULATED PIPE CO.	DURANT INTERNATIONAL CORPN.
1015 RUNNYMEDE STREET	WILLIAMSTOWN
PALO ALTO, CALIFORNIA	NEW JERSEY

should be drafted and the geographical boundaries best adapted to enforcement. Nine papers were given at this panel, and 90 pages are devoted to them.

The final section is on meteorology. Eight papers and 66 book pages are devoted to this subject.

This 847 page book is available to all who are concerned with or interested in the subject of air pollution. It is equally worthwhile to the novice and to the veteran in the field. It may be obtained from the publisher, McGraw Hill Book Co., 330 W. 42nd St., N. Y., at $12.50 a copy.—ALLEN D. BRANDT

District Heating

Official Proceedings, 40th Annual Meeting of the National District Heating Association (held at Swampscott, Mass., May, 1949) has just been published as Volume XL of the proceedings. It includes the president's address and reports of the various committees, which include the technical papers presented at the meeting.

This 338 page volume is available from the association, 827 N. Euclid Ave., Pittsburgh 6, at $10.00 a copy.

Plant Maintenance Problems

A cross section of current industrial engineering thought on maintenance problems is contained in *Techniques of Plant Maintenance — 1952*, which contains the proceedings of this year's annual Plant Maintenance Conference and Show, which was held in Philadelphia. Included are the text of 717 questions asked by engineers who attended, and the illustrated texts of all papers read at the panels. A manual for a lower repair and maintenance cost program, prepared by Westinghouse Electric Corp., is also part of the book.

This 182 page volume, which is being sent without charge to all who attended the conference, is available from the publisher, Clapp and Poliak, Inc., 341 Madison Ave., New York 17, at $6.00 a copy.

OTHER BOOKS AND REPORTS

PRINCIPLES AFFECTING INSULATED BUILT-UP ROOFS, University of Minnesota Engineering Experiment Station Bulletin No. 34, covers roof functions and causes of failure; variables affecting roof construction; air, moisture and heat; moisture migration within roof structures; and the value of insulation in built-up roofing. The authors are C. E. Lund, professor and assistant director of the station, and R. M. Granum, research associate.

This 97 page bulletin may be obtained from the Director, Engineering Experiment Station, Institute of Technology, University of Minnesota, Minneapolis.

MEASUREMENT OF GAS LAW DEVIATIONS WITH BEAN AND BURNETT APPARATUS, Institute of Gas Technology Research Bulletin No. 13, by O. T. Bloomer, is a comparative study of the apparatus as to accuracy and reproducibility in determination of deviations from the ideal gas law, and ease of operation in obtaining this data and calculating results. Both the Bean and Burnett equipment were found by the writer to give results in excellent agreement.

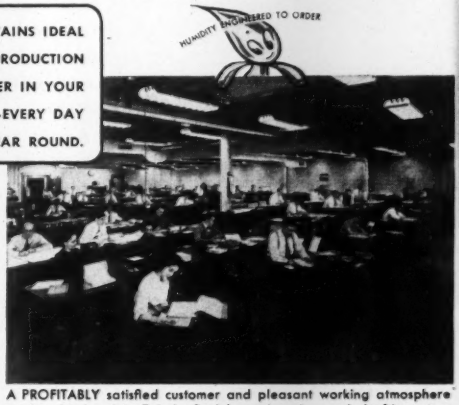
This 12 page bulletin is available from the institute, Technology Center, Chicago 16, at $2.00 a copy.

Kathabar

MAINTAINS IDEAL PRODUCTION WEATHER IN YOUR PLANT—EVERY DAY —YEAR ROUND.

"I'VE GIVEN MY CUSTOMER True Comfort Conditions of 78 F, 45% R.H. EVERY DAY NOW, FOR 11 YEARS"

"ONE OF MY WELL SATISFIED customers, Toledo Scale Co., demands quality in all his purchases. He received quality with his first Kathabar humidity conditioning system, and bought a second.
"I'VE NOTICED my other customers since then. They're reluctant to compromise; they're impressed with Kathabar's plus values. Here are a few of *my sales advantages and customer-holding features:* rigidly-maintained comfort conditions—78F and 45 R. H.—just as continuously accurate as those for processing; dry coils; no shock, no chill; no carry-over."



A PROFITABLY satisfied customer and pleasant working atmosphere go hand-in-hand in Toledo Scale's engineering and drafting room above.

SURFACE COMBUSTION Corporation
TOLEDO 1, OHIO

Kathabar
Surface
Janitrol

SEND FOR the Kathabar Engineering File Folder. Get ideas on how to install air conditioning equipment *profitably*.

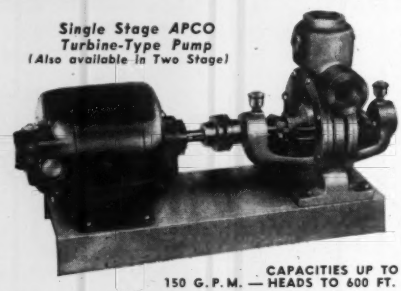
HP-9

☐ Send me the Kathabar Engineering File Folder.
☐ Send me information on.....
(Write here any special humidity problem you may have)

NAME.....
COMPANY.....
ADDRESS.....
CITY.....ZONE.....STATE.....

YOU CAN'T BEAT APCO TURBINE-TYPE PUMPS FOR BOILER FEED

Single Stage APCO Turbine-Type Pump (Also available in Two Stage)



CAPACITIES UP TO 150 G.P.M. — HEADS TO 600 FT.

Specify Apcos because they have "What it Takes"

Apco Pumps will do a better job for your customer friends

You may, with complete confidence, sell — specify — or install APCO on boiler feed duties. APCO pumps are distinguished for their ability to deliver small capacities against high heads with but slight change in capacity or efficiency against drastic head variations. Insure satisfaction with the following array of modern features, found completely ONLY in APCO:

- SIMPLE—WEAR-FREE COMPACT
- HIGH EFFICIENCY
- WILL NOT VAPOR BIND
- HYDRAULICALLY BALANCED
- ACCESSIBILITY
- HIGH SUCTION LIFT (28 ft. at sea level)
- QUIET OPERATION
- HIGH PRESSURE PER STAGE
- DOUBLE SUCTION DESIGN
- PRECISION SHAFTS
- BALL BEARINGS (Support on both sides of Impeller)
- RIGHT OR LEFT HAND OPERATION
- REPLACEABLE COVER PLATES

PUMPS "by Aurora" FOR MANY PURPOSES

Among Apco Turbine-Type Pumps and Aurora Centrifugal Pumps are quality units for many purposes. We invite you to acquaint yourself with the wide variety of Pumps "by Aurora." We invite your inquiries and pledge our friendly cooperation.

Write us for Condensed Catalog or Individual Bulletins

DISTRIBUTORS IN PRINCIPAL CITIES

AURORA Always PUMPS

AURORA PUMP COMPANY

80 Loucks St., AURORA, ILLINOIS

RECENT TRADE LITERATURE

For your convenience in obtaining copies of these bulletins, see coupon on page 189. If you write direct to the manufacturer, describe fully what you want, as the number given first in each item is for use only when sending requests to Heating, Piping & Air Conditioning.

Air Conditioning Controls

HPAC 101—Four new bulletins to be inserted in a controls manual for heating and air conditioning. Bulletin F5225 treats outdoor and return air control; F5226 covers preheat and heating coil control; F5265 describes central control panel systems; and F5173 covers electronic humidity controls. [Manufacturer: Barber-Colman Co., 1228 Rock St., Rockford, Ill.]

Air Conditioning Units

HPAC 102—Bulletin 114 describes and illustrates central station, cabinet type air conditioning units, giving a check list of functional elements for use in preparing specifications. [Publisher: National Association of Fan Manufacturers, Inc., 2159 Guardian Bldg., Detroit 26.]

Air Recovery Cells

HPAC 103—Bulletin 117-C (16 pages) illustrates and describes a line of activated carbon air recovery or purification cells. It has been revised to include data on new equipment. [Manufacturer: W. B. Connor Engineering Corp., Shelter Rock Lane, Danbury, Conn.]

Binfeed Stokers

HPAC 104—Brochure describes "Duraflex" binfeed stokers, showing typical applications. Also shown in blueprint form are the front and side view and floor plan of an ideal boiler room layout. [Manufacturer: Canton Stoker Corp., 407 Andrew Place, S.W., Canton, Ohio.]

Carbon Steel Tubing for Pressure Use

HPAC 105—Data card TDC 142 offers condensed data on mechanical and physical properties, upsetting, swaging, flanging, expanding, bending, and welding of seamless and welded carbon steel tubing. The information is designed for engineers and others associated with the fabrication of equipment operating at elevated temperatures and pressures. [Manufacturer: Tubular Products Div., The Babcock & Wilcox Co., Beaver Falls, Pa.]

Cellular Glass Insulation for Low Temperatures

HPAC 106—Booklet (16 pages) contains specifications for the application of "Foamglas," a cellular glass insulation, in low temperature space installations of −35 F to 50 F. [Manufacturer: Pittsburgh Corning Corp., 307 Fourth Ave., Pittsburgh 22.]

Central Control Panel Systems

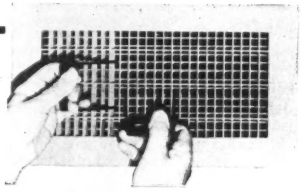
HPAC 107—Bulletin F5265 outlines a technique for designing automatic electric control installations for heating and air conditioning systems. This central control panel technique is designed to simplify installation, reduce overall costs, increase system flexibility, and assist engineers in preparing specification diagrams. [Manufacturer: Barber-Colman Co., 1228 Rock St., Rockford, Ill.]

TAMPER PROOF

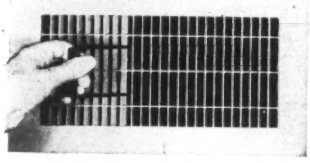
"Solid Bar"

Supply Grilles

Can Only be adjusted with special Adjusting Tool



STYLE — 320 Adjustable Horizontal and Vertical Bars



STYLE — 120 Adjustable Vertical Bars

These Interlocking Bar Type Grilles are essential where Quality, Safety, Ruggedness and Performance are the first consideration. Ideal for Schools, Institutions, Churches, Theaters and Public buildings. Close mesh prevents inserting fingers through openings. Heavy, round edge, bar type construction withstands tremendous abuse.

28 PAGE CATALOG

Features newest, different, comprehensive Performance Tables . . Write . . FREE

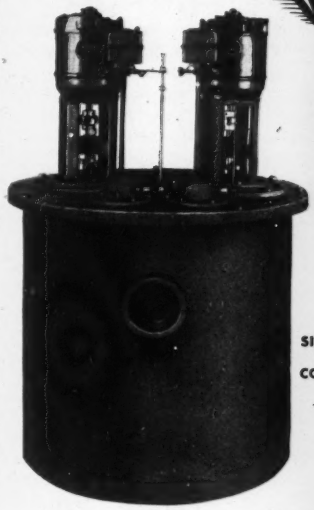
This Sign assures you Highest Quality Products

REGISTER & GRILLE MFG. CO., INC.

70 BERRY STREET, BROOKLYN 11, N. Y.

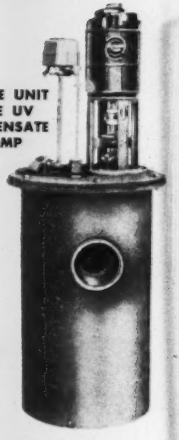
PUT THE RIGHT PUMP ON THE JOB

duplex ?? single



DUPLEX UNIT TYPE UV PUMP

SINGLE UNIT TYPE UV CONDENSATE PUMP



Make the Choice a SKIDMORE

. . . you can be sure of dependable, efficient performance every time.

Engineers know each Skidmore Pump is backed by over a quarter of a century of heating pump know-how. Recommended for low returns, the Single Unit is satisfactory except where heavy duty necessitates the Duplex Condensation Pump.

Tell us your heating problems, our engineers will give their recommendations without obligations. Write for bulletin No. 19-A.

SKIDMORE CORPORATION
ST. JOSEPH, MICHIGAN

Skidmore Pumps

Cleaning of Refrigerant Lines

HPAC 108—Form R-5244 describes the "Dri-Sol" gun, a tool used for forcing cleaning solvent through refrigerant lines and coils under pressure. Also discussed is the company's solvent designed to dissolve wax, sludges and decomposed refrigerant products. [Manufacturer: Ansul Chemical Co., Refrigeration Div., Marinette, Wis.]

Coatings, etc., for Industrial Maintenance

HPAC 109—Catalog covers protective coatings, enamels, plaster bond, and other materials for industrial maintenance. A new price list has been issued showing reductions on six items, including fire retardant vapor barrier, fire retardant lagging adhesive and "Lagfas" white lagging adhesive. [Manufacturer: Benjamin Foster Co., 4635-37 W. Girard Ave., Philadelphia 31.]

Commercial and Industrial Heating

HPAC 110—Bulletin AIA 30-C-43, a manual on commercial and industrial heating, shows the characteristics of various types of gas-fired unit heaters, giving criteria for their selection, and illustrating their use. Also covered are air diffuser accessories for suspended type unit heaters, control of heaters, venting of unit heaters, and the duct furnace. [Manufacturer: Surface Combustion Corp., Janitrol Space Heating Div., Toledo 1.]

Cooling Towers

HPAC 111—Bulletin 47-A describes three types of mechanical draft cooling towers. Covered are a single inlet squirrel cage blower type (capacity range, 3 to 30 tons); a double inlet squirrel cage blower type (capacity range, 32 to 60 tons); and a horizontal induced draft fan type (capacity range, 1 to 100 tons). [Manufacturer: Binks Mfg. Co., 3122 Carroll Ave., Chicago 12.]

Cooling Towers

HPAC 112—Catalog (36 pages) describes a line of cooling towers. It contains details of construction, charts, suggestions on recirculation and surroundings, and includes a data sheet for planning specific requirements. [Manufacturer: Foster Wheeler Corp., 165 Broadway, New York 6.]

Dust and Fume Control in Process Industries

HPAC 113—Brochure describes the use of cloth tube type dust collectors for dust and fume control in process industries. [Manufacturer: American Wheelabrator & Equipment Corp., 1321 S. Byrkit St., Mishawaka, Ind.]

Dust Collection in the Manufacture of Agricultural Chemicals

HPAC 114—Bulletin 342 discusses the use of cloth tube type dust collectors in improving working conditions and recovering material in the manufacture of agricultural chemicals. [Manufacturer: American Wheelabrator & Equipment Corp., 1321 S. Byrkit St., Mishawaka, Ind.]

Electrostatic Air Filters

HPAC 115—Folder lists users of electrostatic precipitators, including hospitals, public buildings, manufacturing enterprises, government installations, utilities and steel plants, industrial laboratories, schools, etc. [Manufacturer: Trion, Inc., 1000 Island Ave., McKees Rocks, Pa.]

for Ducts, Piping and Equipment Handling Air • Flue Gases • Water • Steam

For easy flow control and quick shut-off of low pressure steam, cooling water, draining dehumidifiers, flue gases, air supply and forced draft for combustion equipment, air flow in dust collecting systems, shut-off for ventilating systems, and other warm air and sheet metal applications—

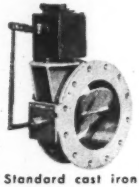
For dependable, trouble-free service install Rockwell Butterfly or Slide Valves. They give full flow area, minimum pressure drop; commercially tight; easy to clean. Pressures to 100 p.s.i. Made of any metal and equipped with hand types or automatic controls. Standard and special types. Sizes—slide valves to 24"; butterfly types—to 72" pipe size and larger.

Write for Rockwell Valve Catalog.

W. S. ROCKWELL COMPANY
254 Eliot Street • Fairfield, Connecticut

W. S. ROCKWELL VALVES
Manual or Automatic

Fabricated steel flanged butterfly valve, 24" pipe size, with lever control, for forced draft air system.

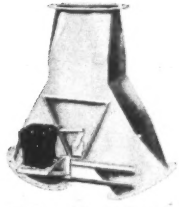


Standard cast iron flanged, butterfly valve with totally enclosed electric motor control.

Small threaded butterfly valve with air diaphragm control unit.

Simple sheet metal slide valve for ventilating and air systems.

Standard slide valve, with pull handle control; sizes in lever and wheel control to 20".

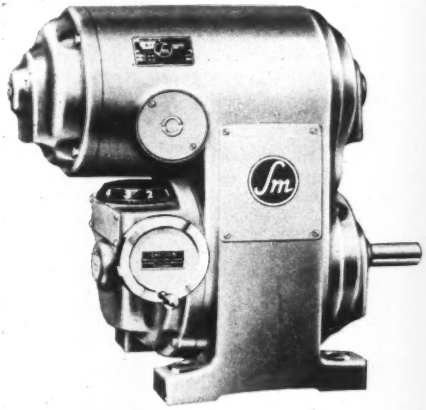


Sheet metal switch gate with removable damper blades, controlled by an electric motor.

Speed-Trols Solve Many Problems of Ventilation Design

Speed-Trol Variable Speed Drives solve many heating, ventilating and air conditioning problems and permit design of flexible systems... states Robert A. Lowe of Storms & Lowe, Consulting Engineers, Los Angeles... Speed Trols allow volume of air to be varied to meet any requirements—more air for summer ventilation, less for winter... systems may be designed with capacity for future additions... future installation of refrigerated cooling coils may be made without loss of air quantity... Speed-Trols provide quiet operation.

STERLING SPEED-TROL



OUTSTANDING FEATURES FOR BETTER AIR CONDITIONING:

Infinite speeds—positive speed regulation—fingertip control—large indicator—positive pulleys—no springs—belt tension in proportion to load—protected—streamlined—Herringbone Rotor—through ventilation—versatile mounting—NEMA dimensions—shock absorbing—quiet operation—rugged—compact—dependable—long life.

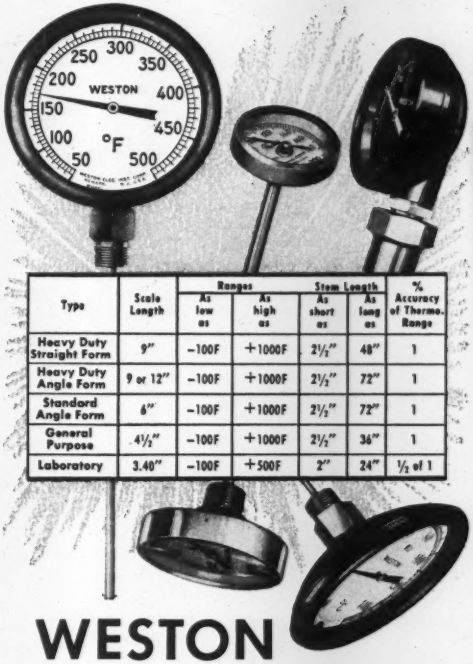
WRITE FOR BULLETIN NO. FQ-112

STERLING ELECTRIC MOTORS

Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile
Offices and distributors in all principal cities

Available

in broadest selection of types, ranges, stem lengths



Type	Scale Length	Ranges As low as	Ranges As high as	Stem Length As short as	Stem Length As long as	% Accuracy of Thermo. Range
Heavy Duty Straight Form	9"	−100F	+1000F	2½"	48"	1
Heavy Duty Angle Form	9 or 12"	−100F	+1000F	2½"	72"	1
Standard Angle Form	6"	−100F	+1000F	2½"	72"	1
General Purpose	4½"	−100F	+1000F	2½"	36"	1
Laboratory	3.40"	−100F	+500F	2"	24"	½ of 1

WESTON

all-metal THERMOMETERS

WESTON Thermometers give you *all* the advantages of all-metal construction *to an unmatched degree.* The durability of stainless steel stems . . . the readability of large, boldly marked scales... the sustained accuracy due to precision manufacture *proved* through the years. Order through your regular jobber, or your local WESTON Representative. Catalog T-13 on request . . . WESTON Electrical Instrument Corporation, 617 Frelinghuysen Ave., Newark 5, New Jersey... *manufacturers of Weston and TAGliabue Instruments.*

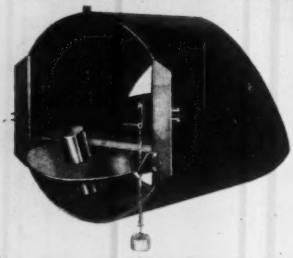
WESTON

Temperature Instruments INDICATE—RECORD—CONTROL

9288

it's another Field
First and Best!

"M-G" Double-Acting
Field Draft Control for
gas
Fired Heating Plants*



*Available at present in commercial sizes only.

Now there's a Field for gas, too! And the same accuracy and sensitivity that have made Field first for coal and oil-fired heating plants make the new Field "M-G" first for gas-fired heating plants. It's the first and only barometric draft control engineered exclusively for gas. Write today for complete details.

SAFETY SWITCH
Optional auxiliary switch will close main gas valve or sound alarm in case of blocked flue or prolonged down-draft, preventing escape of carbon monoxide into building.

The Draft Control
... that's advertised nationally in *BETTER HOMES & GARDENS*

See our Display Booth 152, Oil Heat Institute Convention, Philadelphia.

Field CONTROL DIVISION
H. D. CONKEY & CO., MENDOTA, ILL.
AFFILIATES:
Conco Building Products, Inc.
Brick - Tile - Stone
Conco Materials Handling Division
Cranes - Hoists

Fan for Cooling Electronic Equipment

HPAC 116—Bulletin J-612 covers "Axivane" fans for cooling air-borne or ground-located electronic equipment. Specifications are given. [Manufacturer: Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22.]

Fastening Tools

HPAC 117—Form No. 68 (eight pages) describes and illustrates two models of a powder actuated fastening tool, "Tru-Set" drive pins, external threaded studs, utility head and internal threaded studs, fastening charges, and fixtures. [Manufacturer: Ramset Fasteners, Inc., 12117 Berea Rd., Cleveland 11.]

Flexible Couplings

HPAC 118—Bulletin covers flexible couplings in which the crown distributes the load. Information on construction, horsepower ratings, speeds, application and selection is included. [Manufacturer: De Laval Steam Turbine Co., Trenton 2, N.J.]

Hydraulic Positioning System

HPAC 119—General descriptive folder No. 157 covers a remote control hydraulic positioning system, a single tube system independent of outside energy. It describes the special elastic seal and other features, principle of operation, transmitters, receivers, remotely controlled valves, hydraulic link, etc., and gives thrust and torque capacities. [Manufacturer: Farris Hydrotorque Corp., 563 Commercial Ave., Palisades Park, N.J.]

Industrial Hose

HPAC 120—Pamphlet (eight pages) covers a color-coded, multi-purpose line of industrial hose, now offered in five basic hose types, replacing 18 previous types. [Manufacturer: The Thermoid Co., Trenton, N.J.]

Industrial Process Control

HPAC 121—Second Quarter 1952 issue of *Instrumentation* contains articles on program control, time proportioning control and graphic panels, and describes the manner in which various companies apply instrumentation in the measurement and control of process variables. [Manufacturer: Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Station 213, Wayne and Windrim Aves., Philadelphia 44.]

Industrial Spray Nozzles

HPAC 122—Bulletin 5200 (40 pages) describes industrial spray nozzles for a wide range of commercial and industrial processes. Data includes nozzle dimensions, capacities, spray angles, etc., and all nozzles are illustrated. [Manufacturer: Binks Mfg. Co., 3122 Carroll Ave., Chicago 12.]

Lead Oxide Dust Collection

HPAC 123—Bulletin 332 discusses the collection of lead oxide dust in the manufacture of storage batteries, describing the use of cloth tube type collectors. [Manufacturer: American Wheelabrator & Equipment Corp., 1321 S. Byrkit St., Mishawaka, Ind.]

Liquid Level Control

HPAC 124—Bulletin (Vol. 4, No. 1, of the *Rambler*) describes the new "Autocon Bubbltrol," a packaged, bubbler type liquid level control designed to control levels

Really NEW!

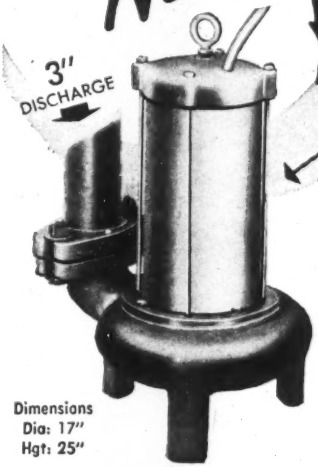
weil SUBMERSIBLE

SCREENLESS SEWAGE EJECTOR

for Residential Installations

Pumps All Household Waste

FROM DISPOSALS • FROM LAUNDRY TRAYS • ALL HOUSEHOLD SEWAGE



Dimensions
Dia: 17"
Hgt: 25"

Designed

- To Operate Underwater
- For Below Floor Level Installation
- For Installation in Limited Space
- For Dirt-Proof Operation

½ — ¾ — 1 Horsepower

ONE HORSEPOWER UNIT HANDLES UP TO 20 RESIDENCES

A Complete Package at Low Cost!

Send for BULLETIN SE 850

weil PUMP CO.

1530 FREMONT ST. — CHICAGO

Also New Submersible Cellar Drainer with 1¼" Discharge

ASK FOR BULLETIN SS 800

The Submersible Sewage Ejectors and Submersible Cellar Drainers are carried in jobbers' stocks

---

Refinite serves the World

WITH WATER CONDITIONING EQUIPMENT & SERVICE

Refinite OMAHA, NEB.

WATER REFINING EQUIPMENT

Write for FREE Bulletins On How Refinite Can Serve You. Address: Dept. HPA

ALSTROM

A Dependable Source for CUSTOM BUILT HEAT EXCHANGERS

guarantees top-performance in...

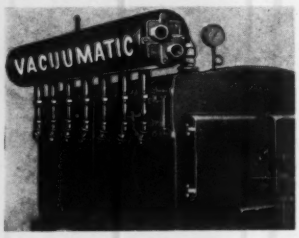
INDUSTRIAL • COMMERCIAL INSTITUTIONAL AND PUBLIC BUILDING INSTALLATIONS

Experienced Alstrom Engineering is your assurance of properly designed and constructed heating equipment—*in stock or tailor made to your specifications.* Alstrom Engineers can also provide you with expert on-the-job guidance.

APPROVED BY THE NEW YORK CITY BOARD OF STANDARDS AND APPEALS NO. 425-51-S.A.

"SAFE GUARD" OIL PREHEATER

A special purpose industrial heat exchanger which is completely "fuel-proof" and really heats oil, this ingenious "double-transfer" oil preheater contains a capillary transfer chamber between oil tubes and boiler water which ends contaminating of boilers and heating systems. The unit positively isolates leaking oil, yet effects rapid, efficient heat exchange. Full range of sizes.



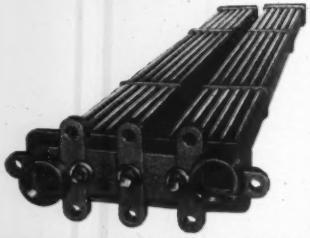
***Vacuumatic Instantaneous Heater**

"The World's Fastest Water Heater"

*Reg. U. S. Pat. Off.

Ideal for all steam heating boilers, this famous development of The Alstrom Corporation has been proven superior in thousands of installations. Write for booklet "The Vacuumatic Story"

SUBMERGED COILS . . . for every purpose



Send for detailed catalog No. 30

Manufacturers of: INDUSTRIAL HEAT EXCHANGERS • TANKLESS GENERATORS • STEAM HEATED INSTANTANEOUS WATER HEATERS • SUBMERGED HEATERS FOR COMMERCIAL STEEL BOILERS • HEAT RECLAIMERS

THE ALSTROM CORPORATION
790 East 176 St. • New York 60, N. Y.

within fractions of an inch. [Manufacturer: Automatic Control Co., 1005 University Ave., St. Paul 4.]

Liquid Strainer

HPAC 125—Bulletin W-6 illustrates the "Ideal" liquid strainer, describing application, parts, working pressures, installation, and dimensions. [Manufacturer: Golden-Anderson Valve Specialty Co., 2104 Keenan Bldg., Pittsburgh 22.]

Manometers

HPAC 126—Bulletin describes "Red Line" manometers, illustrating wall type, absolute pressure, and U tube manometers, as well as indicating flow meters, orifice flanges and plates. [Manufacturer: Trimount Instrument Co., 3119 W. Lake St., Chicago 12.]

Motor

HPAC 127—Illustrated bulletin (8 pages) describes the Type GW "Syncrogear" low speed, right angle worm gear motor. [Manufacturer: U.S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles 54.]

Motors

HPAC 128—Illustrated folder describes various types of motors, including polyphase, wound rotor, synchronous, direct current, single phase, split phase induction, gear, etc. Generators and motor generator sets also are shown. [Manufacturer: Century Electric Co., 1806 Pine St., St. Louis 3.]

Packaged Air Conditioning Systems

HPAC 129—Specification sheet describes two packaged air conditioning systems, one of 10 tons and one of 15.5 tons capacity. Cooling, dehumidification, ventilation, circulation, cleaning (and heating, if desired) are provided by the packaged systems in a five size range. For a copy, write direct to the manufacturer on company letterhead. [Manufacturer: Worthington Corp., Harrison, N. J.]

pH Control in Industry

HPAC 130—Bulletin 430-1 reviews pH theory and its practical applications in industrial measurement and control, explaining the units used in the pH control cycle. [Manufacturer: The Foxboro Co., Foxboro, Mass.]

Propeller Fan Unit Heaters

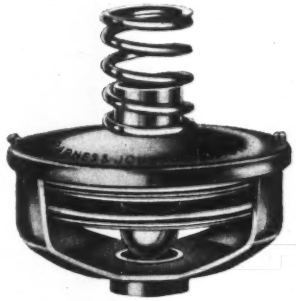
HPAC 131—Catalog presents a line of propeller fan unit heaters, covering applications and specifications for both horizontal and vertical units. [Manufacturer: Airtherm Mfg. Co., 711 South Spring Ave., St. Louis 10.]

Pumps and Coolant Systems

HPAC 132—Illustrated bulletin describes vertical and bronze miniature immersion pumps, a miniature centrifugal pump, rotary gear pumps, coolant pumps, electric sump pumps, and a blower. [Manufacturer: Samuel S. Gelber Co., 162 N. Clinton St., Chicago 6.]

Ratchet Action Pipe Wrench

HPAC 133—Data sheet describes a pipe tool with ratchet action, designed for handling hard-to-get-at pipes. A special toggle design applies force to the pipe circumference. The tool is designed to maintain a constant leverage for all openings. [Manufacturer: Lurie & Lurie, Tool Div., 126 N. Union St., Chicago 6.]



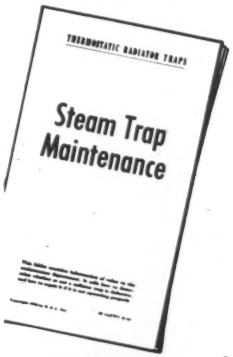
The Easy Way to Check Your Heating System

The "easiest way" for the moment is to do nothing—until you get calls next fall because of hammering noises--hissing—half hot radiators with cold people—or too hot radiators with the windows open.

The real easy way is to check up this summer. The new B & J booklet will tell you what to look for, and explains the B & J test set which you can use on the elements of each trap if you wish.

If you already know that your vacuum or vapor heating system is neither satisfactory nor efficient, it will be quicker and cheaper to buy the B & J cage unit illustrated above and replace all trap units at one time.

This is the unit that contains the thermostatic element, valve piece and seat locked in secure and unalterable adjustment at the factory. All you do is to remove the old unit and seat and put in the B & J cage unit.



Ask for this B & J Bulletin which shows the many ways you can determine how inefficient your heating system really is. It includes a description of the B & J cage unit and the test set.

Ask for your copy now. Bulletin No. R44.

1-C

B&J for QUALITY

Barnes & Jones INCORPORATED

REPRESENTATIVES IN PRINCIPAL CITIES

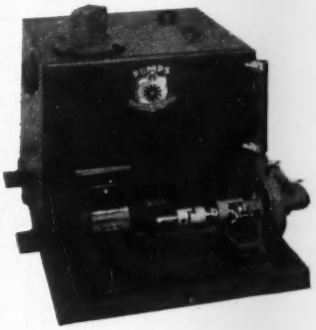
BOSTON 30, MASSACHUSETTS

ANNOUNCING—

The New Improved Design

EAGAN "EAGLE"

CONDENSATE PUMP



MATCH THIS FOR VALUE!

Here's the best condensate pump "buy" on today's market. It provides far more capacity than any similar pump . . . 8,000 sq. ft. EDR at 20 PSI . . . and it's only **$124.00** (trade price, F.O.B. Phila.)

REDUCED PRICE

Compare These Six Features

IMPROVED DESIGN

- Low inlet, 2" I.P.S., 12" from floor
- All bronze centrifugal pump
- Standard ¼ HP 115 volt quiet capacitor motor
- Thermal overload protection
- Driplip base of heavy structural steel with ½" tapped drain
- Flexible connectors on both suction and discharge of pump, and flexible coupling isolate the pump, preventing pipe cramp and misalignment, which cause wear and noise

OTHER MODELS TO 100,000 SQ. FT. 200 P.S.I.

WALTER H. EAGAN CO., INC.

Mfgs. of Condensate, Vacuum, Turbine, Boiler Feed and Centrifugal Pumps.
Pump Specialists since 1920

WALTER H. EAGAN CO., Inc. (Dept. B) MAIL COUPON TODAY
2336 Fairmount Avenue
Philadelphia 30, Pa.

SEND ME FREE DESCRIPTIVE BULLETIN OF THE NEW EAGAN "EAGLE" CONDENSATE PUMP

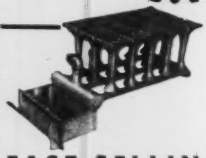
NAME .....

COMPANY .....

STREET .....

CITY ..... Zone.... State.....

ONLY A FEW CHOICE EXCLUSIVE TERRITORIES STILL OPEN!



DEALERS—MANUFACTURERS' AGENTS: Write for information on this

FAST SELLING LINE OF Reinhard GAS CONVERSION BURNERS!

Reinhard Burners are built for converting practically every type of furnace, stove or range. A complete line of domestic, industrial and commercial gas conversion burners. Write today for complete information.

MANUFACTURED SINCE 1932

Laharco Industries

Lyndale and 2nd Ave., N. Minneapolis 5, Minn.

Better Burners Are Made—Laharco Make Them

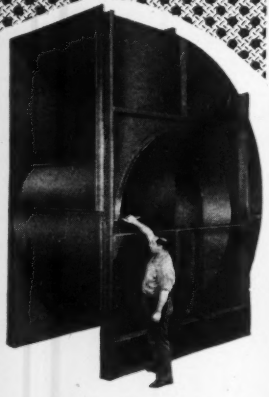
MASSACHUSETTS Power Fixed and Squirrel Cage FANS

POWER FIXED FANS

Backward curve blade type with non-overloading characteristics. Housings constructed of steel plate and reinforced with heavy bracing angles. Wheel sizes Single Width 13½" to 86½" dia. Double Width 18" to 86½" dia. Class I or Class II construction for better fan selection.

SQUIRREL CAGE FANS

Fan wheels have low speed characteristics. The low air velocities permitted are conducive to efficient operation. Housings are rugged and compact. Wheel sizes Single Width 13½" to 86½" dia. Double Width 18" to 86½" dia.



Housing shown above for 86½" wheel

Write for catalogs.

MASSACHUSETTS BLOWER DIVISION

The BISHOP & BABCOCK Mfg. Co.

4901 HAMILTON AVENUE CLEVELAND 14, OHIO

Refrigerant Purger

HPAC 134—Bulletin describes a forged steel purger (No. 370) for venting air and other non-condensable gases from refrigerating systems. [Manufacturer: Armstrong Machine Works, Three Rivers, Mich.]

Refrigerating and Air Conditioning Equipment

HPAC 135—Folder 402 discusses applications of a line of commercial refrigerating and air conditioning equipment. Illustrated are accessible-hermetic units, compressors, standard "Freon" units, air cooling units (ceiling, wall panel, cylindrical, water-defrost, etc.), cooling towers, evaporative condensers, and other units. [Manufacturer: The Frick Co., Waynesboro, Pa.]

Seamless Mechanical Tubing

HPAC 136—Bulletin TB-340 is designed to help the tubing user in determining whether he should use hot finished, cold drawn, or "roto-rocked" seamless mechanical tubing as the basis for his product. It outlines the differences in methods of production, surface finish, tolerances and costs of tubing finished in three ways. [Manufacturer: Tubular Products Div., The Babcock & Wilcox Co., Beaver Falls, Pa.]

Shell Molded Stainless Castings

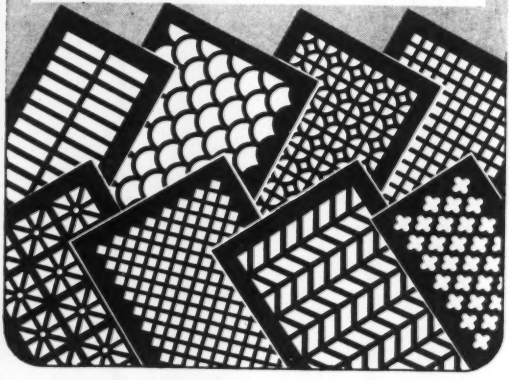
HPAC 137—Technical booklet (eight pages) describes the shell molding process used in producing stainless steel castings, valves and fittings, and discusses such advantages of the process as higher yield, closer tolerances, smoother finish, and minimized cleaning problems. [Man-

AUER GRILLES

Heating, air conditioning and plumbing contractors and engineers receive expert service from Auer on perforated metal grilles. The Auer line includes a variety of attractive designs for all purposes — air conditioning, ventilating, radiator enclosure, or concealment. We furnish almost any size, to your order, and in all available materials. Order Auer grilles by name and number. Send for bulletin showing all designs.

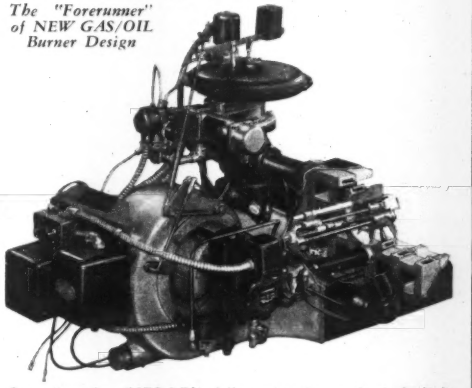
THE AUER REGISTER COMPANY

6600 Clement Ave. Cleveland 5, Ohio



MEET— "FAN-AIR" MGO-3-D3
COMBINATION
GAS AND OIL BURNER
25 - 50 - 100 HP

The "Forerunner" of NEW GAS/OIL Burner Design



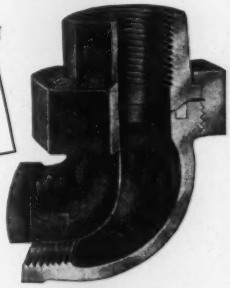
Presenting the (MGO-3-D3) fully automatic mechanical draft **combination GAS & OIL BURNER** with dependable Electronic Flame Failure Protective devices for **Both Fuels.**

A simple **"flip of the switch"** or automatic remote control, changes from GAS to OIL or in reverse. It's an exclusive METTLER design. **Nothing else like it on the market.**

Write for BULLETIN No. 12-S

THE METTLER CO., INC.
(Note New Address)
4366 Worth Street, Zone 63, Los Angeles, Calif.

Simplify
PIPING MAINTENANCE



Use Reliable
JEFFERSON UNIONS

Poor piping installations are eliminated when the joints are made with Jefferson Unions. We know you want the best that's why we make them from a very fine malleable iron having a tensile strength of 55,000 lbs per sq in . . . why we cut the brass rings from special tubing . . . why we air test them before shipping . . . why the ring channels are *machined* instead of cast. We are sure they will provide the answer to any and all piping problems.

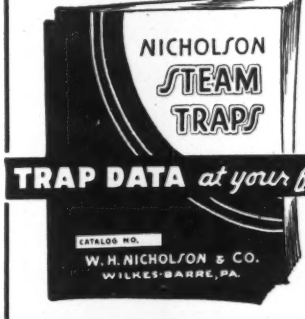
Drop us a line today for more information.

JEFFERSON UNION CO.
607 West 26th Street, New York 1, N. Y.
35 Fletcher Avenue, Lexington 73, Mass.
65 Gooding Street, Lockport, N. Y.

Send for Nicholson
TRAP CATALOG 751

A Standard Reference on Traps for All Applications

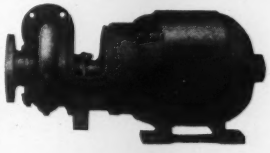
Newly revised, this 32-page reference describes traps for all mediums and pressures: thermostatic and metal expansion for pressures to 250 lbs.; weight and piston-operated for heavy duty. Complete with installation diagrams and formulae for determining proper size trap.



W. H. NICHOLSON & CO.
TRAPS · VALVES · FLOATS
198 OREGON ST., WILKES-BARRE, PA.

Save space and cut installation costs

with GOULDS



"Close-Cupld" Centrifugal Pumps

If you're looking for dependable, 24-hour-a-day pumping efficiency, yet are limited in space—you will find the Goulds Fig. 3650 "Close-Cupld" centrifugal pump ideal. This versatile, adaptable pump is a self-contained unit. It needs no space-consuming special foundations. There's no necessity for an unwieldly base plate to support pump and motor. This compact design also assures quick, easy installation—cutting costly labor time.

The Goulds Fig. 3650 is available in 17 sizes, with capacities up to 2000 G.P.M. Heads up to 400 ft. For complete information send for Bulletin 710.1.

Goulds PUMPS INC.
Seneca Falls New York

G&O COILS for HEATING and COOLING

G&O RADIATION

A full line of sizes now available to meet all industrial requirements. Send for catalog.

THE G&O MANUFACTURING COMPANY
New Haven 8, Connecticut
Pioneer Manufacturers of Square Finned Tubing in the United States

ufacturer: The Cooper Alloy Foundry Co., Bloy St. and Ramsey Ave., Hillside, N. J.]

Squirrel Cage Induction Motors

HPAC 138—Two new data sheets cover squirrel cage induction motors (splash proof ball bearing types). Sheet 6-317, Page 3, on frames 203 to 505, replaces the previous pages 1 and 3. Sheet 6-317, page 5, covers frames 364S to 505S (standard short shaft). [Manufacturer: Century Electric Co., 1806 Pine St., St. Louis 3.]

Strip Chart Program Controllers

HPAC 139—Bulletin 1501 covers "Electronik" strip chart program controllers with electric set point index drive, used for automatic regulation of time-temperature control programs in metal processing and other industries. [Manufacturer: Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Station 213, Wayne and Windrim Aves., Philadelphia 44.]

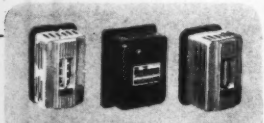
Submersible Sump Pump

HPAC 140—Illustrated data sheet describes a submersible sump pump (Model P-109) manufactured in a cast iron, waterproof case, and incorporating a "No-Float" liquid level control switch. [Manufacturer: Kenco, Inc., 1125 N. Ridge Rd., Lorain, Ohio.]

Tank Car Heater-Pumping Booster

HPAC 141—Form AD-104 (four pages) describes the "Deuce" combination tank car heater and pumping booster. [Manufacturer: Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee.]

A. TYPE B2
B. TYPE B4
C. TYPE B3A



SENSITIVE ROOM TYPE THERMOSTATS FOR DOMESTIC OR INDUSTRIAL USE

The three wall mounting thermostats illustrated, provide precise, sensitive control for domestic or industrial heating, air conditioning or cooling systems. Enclosed in smartly styled housings, they will fit into the decorative schemes of homes, offices or industrial plants. Two of the controls, the Type B2 and Type B3A are available in skeleton form for applications which do not require an enclosure. The specifications for the Type B2, B3A and B4 are covered by Bulletin #1-1. Send for it today.

UNITED ELECTRIC CONTROLS COMPANY
87 School Street, Watertown, Mass.
STANDARD & SPECIAL THERMOSTATS & PRESSURE SWITCHES

REMPE Baseboard CONVECTORS

√ Reduced cost — up to 25% per sq. ft. EDR.

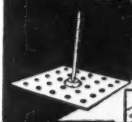
√ Installation much more simple — installation labor cut as much as 50%.

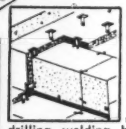
Completely redesigned coil. Proven under actual heating conditions. Easy to order and to fit in available space — on the job. Cover size 3" deep by 8" high. Attractive. • Efficient.

GET THE FACTS — — —
Write for details and prices

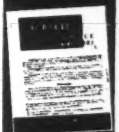
REMPE COMPANY
342 N. Sacramento Blvd. • Chicago 12, Ill.

FOR
SPEED AND ECONOMY
INSULATE
WITH
Miracle
SURFACE ANCHORS AND ADHESIVES



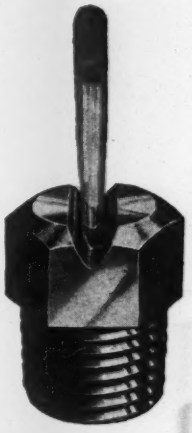


Miracle Surface Anchors bonded with Miracle Adhesives provide firm anchorage for all types of Insulation. This includes Batt, Fiber Glass, Foam Glass, Cork, etc. to ducts, walls, or ceilings. No drilling, welding, bolts, screws or other mechanical means of attachment required. Miracle Surface Anchors are available in a variety of shapes and sizes to accommodate the particular job, and have been endorsed by leading Insulation Contractors and Architects everywhere because of their labor and time saving features. For information write:
Dept. HPAC-5-51
MIRACLE ADHESIVES CORP.
214 E. 53rd St., New York 22
For anchors write
DEVICES, INC.
214 E. 53rd St., New York 22



FREE interesting, colorful brochure on miracle surface anchors! Write for your copy today.

EFFICIENT LOW COST SPRAYING!



DELAVAN'S Type WF Spray Nozzle delivers a flat, uniform spray ideal for:

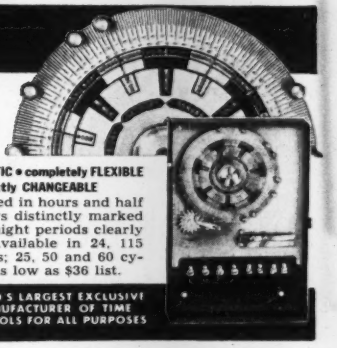
Metal Cleaning
Industrial Washing Machines
Hot Asphalts Spraying
Gravel Washing
Coal Washing

. . . and many other industrial applications.

Write for Catalog No. 30

DELAVAN MANUFACTURING CO.
3009 SIXTH AVENUE
DES MOINES 13, IOWA

Here's how to **CUT YOUR CUSTOMERS' FUEL BILLS**



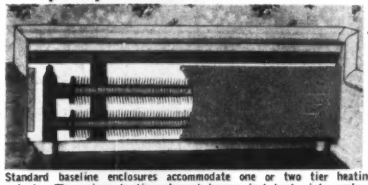
Always Install a PARAGON 700 Series 7-Day Calendar Time Switch

When you install a 700 Series Time Switch on a heating job, you insure economical operation — and customer satisfaction. For example, it's simple to set the dial to switch to a lower thermostat setting *automatically* Saturday noon, then switch back to the higher setting earlier than usual Monday. At the same time a regular switching schedule for night shutdown of the heating system can be maintained the rest of the week. You can accurately set operations from ON to OFF or from OFF to ON as close as 3 hours apart . . . at *different* hours each day if necessary . . . or you can omit any days desired. You can set it in advance for automatic control of a week's operations — yet make changes instantly when necessary! Send for complete details — now! Ask for bulletin No. HP-5207.

• fully AUTOMATIC • completely FLEXIBLE • instantly CHANGEABLE
Dial graduated in hours and half hours — days distinctly marked — day and night periods clearly separated. Available in 24, 115 and 230 volts; 25, 50 and 60 cycles. Prices as low as $36 list.

PARAGON ELECTRIC COMPANY
TWO RIVERS, WISCONSIN
TWO RIVERS, WISCONSIN
WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF TIME CONTROLS FOR ALL PURPOSES

HEATING CONTRACTORS
Specify "Baseline" Baseboard Convectors



. . . for their
CLEAN
NOISELESS
EFFICIENT
ECONOMICAL
HEAT

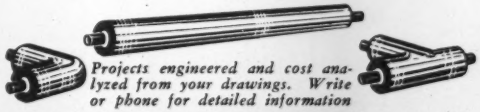
Standard baseline enclosures accommodate one or two tier heating elements as required. The unique heating element hanger just hooks into enclosure support bracket and is pivoted so it will move right or left allowing for noiseless expansion and contraction.

Baseline Mfg Corp
3111 NORTH WASHINGTON AVE
MINNEAPOLIS 11, MINN.

Baseline is the noiseless baseboard.
EASTERN SALES OFFICE
2137 "K" Street, N. W.
Washington 7, D. C.

Low Heat Loss YELLOW JACKET! STEEL ARMOURED INSULATED PIPE

transmits refrigerants, hot water or steam . . . through underground or exposed locations
PREFABRICATED • PRE-SEALED • WATER-PROOF

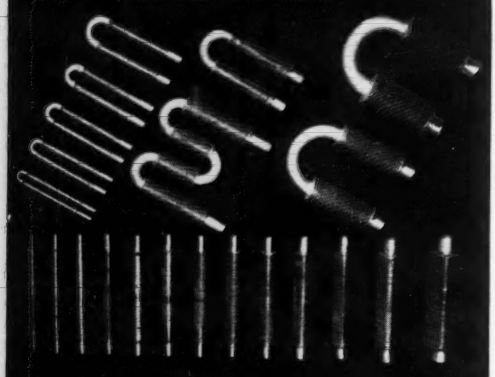


Projects engineered and cost analyzed from your drawings. Write or phone for detailed information

AMERICAN INSULATED PIPE COMPANY
122 EAST 42 ST. • NEW YORK 17, N. Y. • LE 2-9316

RO-FIN TUBES

IDEAL SURFACE FOR HEAT TRANSFER



Over 100 sizes in production!

ROME

TURNEY RADIATOR COMPANY

209 CANAL STREET • ROME • NEW YORK

Thermometers and Gages

HPAC 142—Form G-158 presents a line of recording thermometers and gages, and dial indicating thermometers. Illustrations show typical installations, mountings, case types, etc. A price list and a folder giving operating instructions for the Model 500 recorder also are available. [Manufacturer: The Electric Auto-Lite Co., Instrument and Gage Div., Toledo 1.]

Unit Heaters

HPAC 143—Folder describes features of, and gives capacity tables for "Grid" unit heaters. [Manufacturer: D. J. Murray Mfg. Co., 1002-24 Third St., Wausau, Wis.]

Unit Heaters

HPAC 144—Catalog 596 covers a new line of five gas-fired unit heaters with welded steel heat exchangers — National Radiator Co., 221 Central Ave., Johnstown, Pa. It offers component, cut-away, and full view illustrations of the heaters, which have an input range from 55,000 to 200,000 Btu per hr. AGA approved for use with natural, mixed, manufactured and propane gases, they are intended for commercial and industrial applications.

Valves

HPAC 145—Eight page catalog describes "Univalve" integral seat all purpose forged steel valves, rated for 1500 and 2500 lb — Edward Valves, Inc., 1200 W. 145th St., East Chicago, Ind. Covered are globe valves for blow-off service and check type valves of spring loaded piston design.

Here's sound advice . . .

MAKE

HAJOCA

YOUR

ONE SOURCE OF SUPPLY

for the BEST in Plumbing and heating Materials and Kitchen Equipment . . .

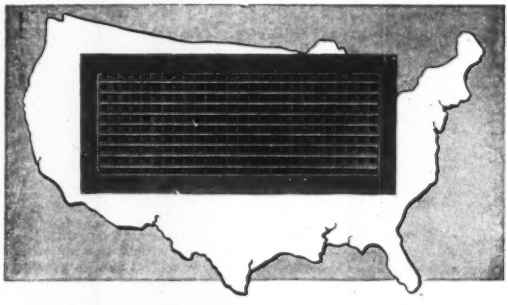
AMERICAN-STANDARD Plumbing & Heating Materials
BERGER Steel Kitchen Cabinets
MERION Automatic Gas Water Heaters
PEMCO Electric Water Heaters
SPENCER Boilers
ELECTROL Oil Burners
ADELTA Standardized Duct & Fittings

And other Nationally Known Products

PLUMBING HEATING INDUSTRIAL SUPPLIES — HAJOCA — SINCE 1858

HAJOCA CORPORATION

General Offices
31st & Walnut Sts., Philadelphia 4
33 Branches Serving the Atlantic Seaboard
Consult your local phone book



From Coast to Coast!

STEWART High Velocity Outlets are used for QUIET DIRECTIONAL air distribution.

We would like to supply your needs, too!

There are qualified representatives in principal United States cities—in Canada, Douglas Engineering Co., Ltd. Montreal — or write direct to factory.

Stewart MFG. CO., INC.
CEDAR GROVE
NEW JERSEY

100

INSTANT HEAT!

FOR COLD MORNINGS, HARD-TO-HEAT PLACES

CHROMALOX Electric UNIT HEATERS

EASY TO INSTALL WHEREVER TEMPORARY OR PERMANENT COMFORT HEAT IS NEEDED

CHROMALOX Unit Heaters quickly and economically give needed warmth wherever heat is required. Air is forced across CHROMALOX Finstrip elements by a quiet fan and directed into the desired areas by adjustable louvers. High velocity discharge assures adequate supply of heated air. Units are available with manual or automatic controls in 1.5 to 15 KW. capacities.

WRITE FOR COMPLETE CATALOG

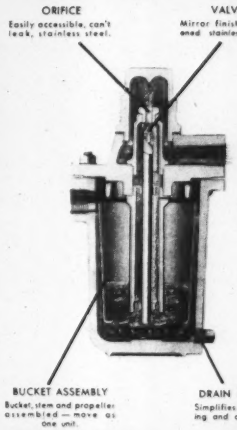
It shows complete line of Chromalox Unit heaters available for permanent or temporary installation. Send for your copy today.

EDWIN L. WIEGAND CO., 7610 THOMAS BOULEVARD, PITTSBURGH 8, PA.

CHROMALOX 18-97

ELECTRIC HEATING AT ITS BEST!

no wire drawing with a TRERICE trap!



Wire drawing—a bugaboo for most traps—has been practically eliminated by the rotating valve feature of a Trerice trap. Bucket, valve stem and propeller—assembled as one unit—comprise the only moving part. Water action rotates the propeller causing the valve to seat differently in the orifice at each discharge. As a result, there's even wear all way 'round. Remember, too, you can completely inspect or service the valve and seat in a Trerice trap in a matter of minutes—without removing it from the line or disturbing high pressure bolts.

But—see for yourself! We'll be glad to provide a 60-day trial installation under your own conditions and without obligation. Write today.

H. O. TRERICE CO. *Since 1923*

Manufacturers of TEMPERATURE INSTRUMENTS

1426 W. LAFAYETTE BLVD. DETROIT 16, MICHIGAN

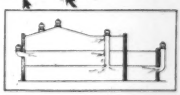
Branches in principal cities

MOISTURE'S NO PROBLEM

MUCKLE VENTS

chase out foul, wet air!

- Good looking
- Fit any roof
- Easy to install
- Motor out of line of air flow — for better performance in moisture filled air.



Muckle MANUFACTURING CO. OWATONNA 8, MINN.

WRITE TODAY FOR COMPLETE INFORMATION

TRUSCON PRESSED STEEL INSERTS

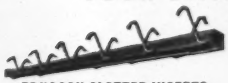
—the domestic engineering contractor's answer to the problem of:

anchoring . . . . pumps, tanks, and all other similar types of service equipment.

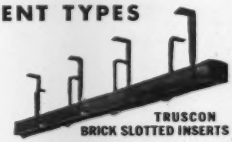
fastening . . . . . motors, meters, blowers, etc., to walls and columns.

suspending . . . pipes, pipe galleries and conduits from ceilings, walls or columns.

FOUR DIFFERENT TYPES



TRUSCON SLOTTED INSERTS



TRUSCON BRICK SLOTTED INSERTS

TRUSCON ADJUSTABLE INSERTS

TRUSCON TAPPED INSERTS

Truscon Pressed Steel Inserts are placed in the correct, desired position BEFORE the concrete is poured. Saves time, labor, money. Assures correct placement of fixtures and easy, quick changes.

WRITE FOR ILLUSTRATED LITERATURE!

TRUSCON STEEL COMPANY

1118 Albert Street, Youngstown, Ohio • *Subsidiary of Republic Steel Corporation*

SPRAY NOZZLES... two guides to proper selection!

No matter what you may face in the way of a spraying problem, it can be solved quickly and at low cost with Spraying Systems Spray Nozzles. Two fact-packed catalogs—No. 22, General Industrial Spray Nozzles, and No. 23, Pneumatic Atomizing Nozzles—are yours for the asking. They show you all the various types of spray nozzles available . . . explain design and construction . . . and outline spray characteristics such as atomization, impact of spray and capacity. Write for your copies today.

SPRAYING SYSTEMS CO.
ENGINEERS AND MANUFACTURERS
3219 RANDOLPH STREET BELLWOOD, ILLINOIS

WRITE FOR CATALOGS NO. 22 AND NO. 23

Ventilating Equipment Selection Guide

HPAC 146—Ventilator equipment selection guide, with a new type of capacity table. In place of pages covering all units and capacities in the line, all the essential figures have been condensed into a single wide-spread tabulation which can be viewed at one time. [Manufacturer: Bayley Blower Co., 6610 W. Burnham St., Milwaukee 14.]

Visual Smoke and Combustion Indicators

HPAC 147—Bulletin 5101 describes the "Wyd-Angle Smoke Periscope" which has a 90 deg vision angle, and the "Cat's Eye" furnace indicator. [Manufacturer: Ess Specialty Corp., 96 S. Washington Ave., Bergenfield, N. J.]

Water Treatment Units

HPAC 148—Bulletin (four pages) describes galvanic cell water treatment units for preventing scale and corrosion in boilers and hot water systems. [Manufacturer: Electromatic Water Treatment, Inc., 475 5th Ave., New York 17.]

AN ECONOMIC STUDY OF FUELS IN MANUFACTURING, by W. H. Voskuil (University of Illinois Engineering Experiment Station Circular Series No. 63) discusses types of fuels used in manufacturing (including costs), electric power in manufacturing, and fuels and power in the iron and steel industries.

This 28 page booklet is available from the Office of Publication, University of Illinois, Urbana, at 40 cents a copy.

KEYNOTES

"There's no stopping Wilbur since we began using Key-Tite to speed our pipe assembly."

The perfect seal for pipe joints that carry water, gas, low-pressure steam, etc.

Write For FREE Sample!

SEALS TIGHT... BREAKS RIGHT!
A Product of KEY COMPANY

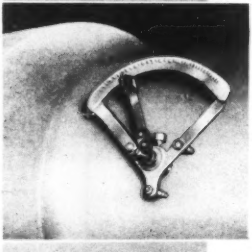
KEY-TITE WATER PROOF PIPE JOINT COMPOUND

2617 McCasland · East St. Louis, Illinois

SAVE with Fuelguard

fuel...time...money

HEAVY DUTY DAMPER REGULATOR



IT'S SAFER... BETTER LOOKING... MORE ECONOMICAL... DOES A BETTER JOB

Easy-to-install FUELGUARD helps prevent fuel waste by making possible precision-adjustments (for control of drafts in medium to large boilers). Universally adaptable to all installations (manual or automatic controls). Let FUELGUARD "go to work for you."

Damper-positioner Quadrant with lubricated bearings, indicating scale, locking device.

For full details write to Ashcraft

Fuelguard
5643 Dyer St. - Dallas

CLASSIFIED ADVERTISING

Classified Section: Rates for classified advertising are 12 cents for each word, including heading and address. One inch $6.00. Count nine words for keyed address. Minimum $2.00 for each insertion. Cash must accompany order.

situations open

Manufacturer of heating, ventilating and air conditioning equipment has important sales application position open for good mechanical engineer who is familiar with this type of business. Midwest location — excellent opportunity for development. Address Key 974A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

Wanted salesman to contact heating and ventilating contractors as well as architects for well known corrosion resistant fan manufacturer in midwest territory with headquarters in Chicago. Salary and expenses. Reply in detail — Key 975A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

Sales Engineers with experience in the sale of mechanical equipment, wanted for positions involving general application and sale of heating, ventilating, and air handling apparatus for commercial and industrial buildings, industrial processes, and mechanical draft. Positions are available at various locations. Personal interviews will be granted only after receipt of written application giving full details of experience. Address Sturtevant Division, Westinghouse Electric Corp., Dept. AH, Hyde Park, Boston 36, Mass.

Product Engineer to assist chief engineer in new developments and design improvements on residential cooling and heating equipment with a back ground of 5 to 10 years experience in this type or similar work. Excellent opportunity with an established and growing concern in the Baltimore, Maryland-Washington, D.C. area. Reply to contain complete details of personal data, education and work history." Address Key 972 A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

situation wanted

Mechanical Engineer—A S M E Registered Professional Engineer. Experienced in design, application, operation and maintenance of Air Conditioning, Heating and Ventilating equipment. Presently employed as Air Conditioning Engineer for large industrial plant. Desires position with manufacturer, contractor, engineer or distributor. Address Key 980A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

for sale

Westinghouse 7½ ton air conditioning equipment; New Model CLS-282 refrigeration compressor, used model CLS 275 refrigeration compressor, used model CWC-25 condenser, and used type FA-2530-5 five row coil evaporator. Edward Valves Inc., East Chicago, Indiana.

Well established D T U plumbing and heating business in Indiana town of approximately 50,000 population. Main street location with large show room. Well displayed plumbing fixtures and heating equipment, six complete kitchen displays, also major appliances including television. We distribute a line of high quality paint and carry the largest stock in town. Would like to sell part interest to someone capable of taking over some of the managerial responsibilities. The doctor recommends my cutting down on work and responsibility. Address Key 979A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave, Chicago 2, Ill.

What Happened to That Pint of Blood YOU Were Going to Give

situations wanted

Manager Available — For heating and oil burner department. Executive type, proven ability, with background of many years Heating business. Knows industrial, commercial, domestic heating and oil burning. Thoroughly familiar all phases from start to completion of job. Capable taking full charge and reorganizing for greater profits and efficiency. Member ASHVE. Excellent references. Address Key 977 A, Heating, Piping and Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

Refrigeration Engineer, full member of ASHVE and ASRE 18 years experience in design, projecting, service and executive posts, at the present time engaged with one of the largest U.S. firms in South America, will be available in the United States on end of September. Desires responsible position in design, research and product development of refrigeration and air-conditioning units, or executive post in export business of refrigeration products. Interested also in position of consulting engineer. Address Key 971A, Heating, Piping & Air Conditioning, 6 No. Michigan Avenue, Chicago 2, Ill.

Canadian, age 31, university degree, 3 years experience heating and ventilation, desires position with consultant in heating, ventilation, power plants. Address Key 973 A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

lines wanted

Manufacturers or Distributors of Steam Package Generators, Industrial oil burners, various types heating equipment. Can you use services of qualified, capable sales representative? Thorough knowledge Heating and Oil Burner business. Worked with Architects, Owners, Engineers. Arranged dealer setups. Can layout Heating and Oil Burner systems. ASHVE member. Available immediately. Address Key 978A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

agents wanted

Manufacturer of package steam generators and conventional type boilers from 5 to 250 HP requires aggressive representation now operating in the following areas: New England, New York, Ohio, Mississippi, Louisiana, Florida, Texas and the West Coast. Address Key 976 A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2, Ill.

for sale

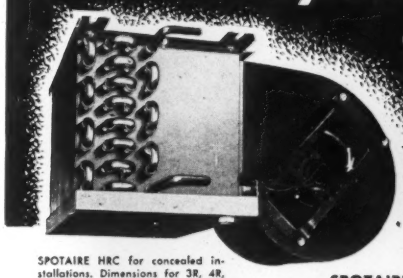
Model PF-606-CU Frick 60 Ton Refrigerating Unit with Frick 12" X 18' long dry Expansion Cooler A-1 Condition. Used less than 200 hours. Price $5200.00. F.O.B. Fort Gibson, Okla., W. R. Grimshaw Company, 208 Kome Bldg., Tulsa 3, Oklahoma.

Quiet Beyond Belief!

SPOTAIRE

Series HRC

ROOM UNIT AIR CONDITIONER



SPOTAIRE HRC for concealed installations. Dimensions for 3R, 4R, and 6R models are the same.

SPOTAIRE HRC UNITS POSSESS SILENCE OF CENTRAL DUCT SYSTEM

HRC UNITS ARE DESIGNED FOR INSTALLATIONS WHERE QUIETNESS IS ESSENTIAL. ACCOMPLISHED BY USING A LARGE FAN REVOLVING AT LOW SPEED. (EXCLUSIVE d-h FEATURE) AND MAY BE SPECIFIED FOR HOSPITALS, MOTELS, HOTELS, APARTMENTS, RESIDENCES, AND OFFICES.

HEATS, COOLS, FILTERS, VENTILATES AND RECIRCULATES AIR. NO DUCT WORK REQUIRED. LOW INITIAL COST. SIMPLE INSTALLATION. THE FINEST ROOM UNIT SYSTEM MADE.

Write for literature

FOR NEW OR OLD CONSTRUCTION

AVAILABLE FOR HOT OR COLD WATER OR DIRECT EXPANSION REFRIGERANT

drayer-hanson

Box 2215 Terminal Annex
Los Angeles 54, California

INDEX TO ADVERTISERS

A-J Mfg. Co. ..... *
Acme Industries, Inc. 59
Aerco Corp. ..... *
Aerofin Corp. 149
Air Devices, Inc. 9
Air-Maze Corp. ..... *
Airtex Corp. ..... *
Airtherm Mfg. Co. 138
Aladdin Heating Corp. ..... *
Alco Valve Co. 8
Aldrich Co. 241
Allen-Bradley Co. 22
Allis-Chalmers Mfg. Co. 23, 156
Alloy Steel Products Co., Inc. 13
Alstrom Corp., The 254
American Air Filter Co. ..... *
American Blower Corp. 35
American Brass Corp., The 40
American Chain & Cable Co., The ..... *
American Hair & Felt Co. 242
American Insulated Pipe Co. 259
American Radiator & Standard Sanitary Corp. 163
Ames Iron Works ..... *
Anderson Co., V. D. 139
Anemostat Corp. of America 29
Armstrong Cork Co. 229
Armstrong Machine Works 43
Ashcraft Co. 262
Atlas Mfg. Co. 226
Auer Register Co. 256
Aurora Pump Co. 248
Autorad, Inc. 241

Babcock & Wilcox Co. 66
Badger Manufacturing Co. 242
Barber-Colman Co. 169
Barnes & Jones, Inc. 255
Baseline Manufacturing Corp. 259
Bayley Blower Co. 12
Bell & Gossett Co. 160
Bertram Co., The, Harvey P. ..... *
Binks Mfg. Co. 235
Bishop & Babcock Mfg. Co., The 256
Bituminous Coal Institute 166
Black & Decker Mfg. Co. ..... *
Blaw-Knox Corporation 240
Bonney Forge & Tool Works 142
Boyle-Midway Inc.
(American Home Products Corp.) ..... *
Breidert Co., G. C. ..... *
Brunner Mfg. Co. 205
Bryant Heater Div., Affiliated Gas Equip. 136
Buffalo Forge Co. ..... 64 & 65
Buffalo Pumps, Inc. 233
Bullard Co., The 41
Bundy Tubing Co. 27
Burnham Corporation 141
Bush Mfg. Co. 4
Byers Co., A. M. ..... *

Campbell Heating Co. 203
Canton Stoker Corp. 174
Carey Co., Philip, The ..... *
Carnes Co., W. R. ..... *
Carrier Corp. 31
Cash Co., A. W. 181
Century Electric Co. 63
Chase Brass & Copper Co. ..... *
Chester Cable Corp. ..... *
Chicago Pump Co. ..... *
Clarage Fan Co. ..... Inside Back Cover
Clark Mfg. Co. 238
Cleaver-Brooks Co., Boiler Division 173
Combustion Engineering—
Superheater Inc. 211
Comfort Products 176
Committee on Steel Pipe Research of American Iron & Steel Institute ..... *
Connor Engrg. Co., W. B. 47, 209
Connental Air Filter, Inc. ..... *
Copeland Refrigeration Corp. ..... *
Crane Co. 57
Crocker-Wheeler Div., Elliott Co. .. 10 & 11
Curtis Refrigerating Machine Co. 19
Cyclotherm Corp. ..... *

Davis Engineering Corp. 235
De Bothezat Fans Division
American Machine & Metals, Inc. 193
De Laval Steam Turbine Co. 28
Delavan Mfg. Co. 259
Delco Prods. Div., General Motors Corp. 147
Detroit Lubricator Company ..... *
Detroit Stoker Co. 144
Dodge Mfg. Co. 32
Dole Refrigerating Co. ..... *
Dollinger Corp. 227
Dravo Corp. ..... 60 & 61
Drayer-Hanson, Inc. 263
Dunham Co., C. A. 213
Durant Insulated Pipe Co. 246
Dutton Boiler Div., Hapman-Dutton Co. . 26

Eagan Co., Inc., Walter H. 255
Eclipse Fuel Engrg. Co. ..... *
Economy Pumps, Inc. ..... 24 & 25
Emerson Elec. Mfg. Co. ..... *

Farr Co. 6
Fedders-Quigan Corp. ..... *
Field Control Div., H. D. Conkey & Co. 252
Fisher Governor Co. 194
Fitzgibbons Boiler Co., Inc. 133
Flexitallic Gasket Co. ..... *
Foster Wheeler Corp. ..... *
Frick Co. 216
Fulton Sylphon Co. 167

G. & O. Mfg. Co., The 258
Gallaher Co. ..... *
General Blower Corp. ..... *
General Controls Co. ..... *
General Electric Co. ..... *
Gerstein & Cooper, Inc. ..... *
Glasfloss Corp., The 151
Glass Fibers, Inc. 175
Globe Steel Tubes Co. 148
Goulds Pumps, Inc. 257
Governair Corp. 208
Grabler Mfg. Co. 214
Greenlee Tool Co. 237
Grinnell Co., Inc. ..... Inside Front Cover

Hajoca Corporation 260
Hamilton-Thomas Corp. ..... *
Handy & Harman ..... *
Hastings Instrument Co. ..... *
Hayes Furnace & Mfg. Co., Inc. ..... *
Heil Process Equipment Corp. ..... *
Hendrick Mfg. Co. 234
Henry Valve Co. ..... *
Hoffman Specialty Co. 48
Howell Electric Motors Co. ..... *
Hussey & Co., C. G. ..... *

Ilg Electric Ventilating Co. 168
Illinois Engineering Co. 18
Illinois Testing Laboratories, Inc. ..... *
Independent Register Co. 202
Industrial Acoustics Co., Inc. ..... *
Industrial Sound Control Inc. 196
Infra Insulation, Inc. 191
Ingersoll-Rand ..... *
Iron Fireman Mfg. Co. ..... *

Jackson & Church Co. 135
Jefferson Union Co., Inc. 257
Jenkins Bros. 188
Jenn Air Products Co. ..... *
Johns-Manville ..... *
Johnson Co., S. T. 244
Johnson Service Co. ..... Outside Back Cover
Joy Mfg. Co. 56

Keasbey & Mattison Co. ..... *
Kennard Corp. 152
Kennedy Valve Mfg. Co., The ..... *
Kewanee-Ross Corp. 183
Key Co. ..... 179 & 262
Klipfel Valves, Inc. ..... *
Korfund Co., Inc., The 204
Kramer Trenton Co. 230
Kritzer Radiant Coils, Inc. ..... *

Ladish Co. 165
La Harco Industries 256
Lake Chemical Co. ..... *
Lee Corporation, The 236
Leslie Co. 157
Lincoln Electric Co., The 223
Lunkenheimer Co., The ..... *

Maid-O'-Mist, Inc. ..... *
Malleable Iron Fittings Co. ..... *
Manning & Lewis Engineering Co. 224
Marley Co., The 14
Marlo Coil Co. ..... *
Marsh Heating Equipment Co. ..... *
McCord Corp. 228
McDonnell & Miller, Inc. 15
McQuay, Inc. 58
Mercoid Corp., The ..... *
Mettler Co., Inc., The 257
Mid-Continent Metal Products Co. 220
Midwest Piping & Supply Co. 49
Mineralac Electric Co. ..... *
Minneapolis-Honeywell Regulator Co. 20 & 21
Miracle Adhesives Corp. 259
Mitchell Co., John E. ..... *
Modine Mfg. Co. 161
Muckle Mfg. Co. 261
Mueller Brass Co. ..... *
Mueller Furnace Co., L. J. 201
Multi-Vent Div., Pyle National Co. ..... *
Mund Boilers, Inc. ..... *
Mundet Cork Co. 154
Mystik Adhesives Products ..... *

Nash Engineering Co. 74
National Tube Div.,
United States Steel Corp. 46
Nelson, Herman Div. of American Air Filter Co., Inc. ..... *
Nesbitt, Inc., J. J. 70
New York Blower Co., The 164
Niagara Blower Co. ..... *
Nicholson & Co., W. H. 257

Ohio Brass Co. 52
Ohio Injector Co. 182
Olson & Company, Arthur A. 197
Orr & Sembower, Inc. ..... *
Owens-Corning Fiberglas Corp. ..... *

Packless Metal Products Corp. ..... *
Paragon Electric Co. 259
Patterson-Kelley Co., Inc., The ..... *
Peerless Elec. Co. ..... *
Peerless Pump Div., Food Machinery & Chemical Corp. 231
Penn Controls, Inc. 158
Penn Ventilator Co. ..... *
Perfex Corp. 239
Pittsburgh Corning Corp. ..... *
Porter & Co., H. W. 243
Powell Co., The Wm. 140
Powers Regulator Co., The 37

Prat Daniel Corp., Thermobloc Div. ..... *
Preferred Utilities Mfg. Co. ..... *
Pritchard Co., J. F. 7
Propellair, Inc. ..... *
Pur Air Div.,
American Solvent Recovery Corp. .. 143
Pyle-National Co., The 62

R P & C Division American Chain & Cable Co., The ..... *
Ramset Fasteners, Inc. 210
Reading Tube Corp. ..... *
Ready-Power Co., The ..... *
Refinite Corp. 253
Register & Grille Mfg. Co. 249
Rempe Co. 258
Republic Steel Corp. ..... *
Revere Copper & Brass, Inc. 73
Ric-wiL Co., The ..... *
Ridge Tool Co. 198
Rockwell Co., W. S. 250
Rome-Turney Radiator Co. 260
Ruppright's Rotary Roof Cooler ..... *

Sarco Co., Inc. 54
Sarcotherm Controls, Inc. ..... *
Schaub Engineering Co., Fred H. ..... *
Servel, Inc. 217
Siemon & Co. ..... *
Skidmore Pumps 249
Skilsaw, Inc. ..... *
Smith Co., Inc., H. B., The ..... *
Spang-Chalfant Div. of
The National Supply Co. 153
Spence Engineering Co., Inc. 185
Spencer Heater, Avco Mfg. Corp. 146
Sporlan Valve Co. ..... *
Spraying Systems Co. 262
Standard Stamping & Perforating Co. .. 159
Stedco Products ..... *
Stephens-Adamson Mfg. Co. 187
Sterling Electric Motors 251
Sterling, Inc. 222
Stewart Mfg. Co. 260
Stic-Klip Mfg. Co. ..... *
Superior Combustion Industries, Inc. 178
Surface Combustion Corp. ..... 184 & 247
Swartwout Co. 232

Taco Heaters, Inc. 186
Taylor Forge & Pipe Works 171
Taylor Instrument Cos. 162
Thrush & Co., H. A. 51
Titus Mfg. Corp. 153
Titusville Iron Works Co., The, Div. of Struthers Wells Corp. 212
Trane Co., The ..... 44 & 45
Trerice Co., H. O. 261
Trindl Products, Ltd. ..... *
Truscon Steel Co. 261
Tube Turns, Inc. ..... 199 & 200
Tuttle & Bailey, Inc. ..... *

Union Asbestos & Rubber Co. 206, 207
Unistrut Products Corp. 225
United Cooling Tower Co. 245
United Electric Controls Co. 258
United States Air Conditioning Co. 3
United States Gauge Div.,
American Machine & Metals, Inc. .. 150
United States Steel Co. ..... 46 & 219
United States Steel Co. (U. S. Supply) . 219
Universal Diffusers Corp. ..... *
Utility Appliance Corp. 38

Vulcan Radiator Co. 34

Wagner Electric Corp. 55
Warworth Co. 42
Ward Leonard Elec. Co. 39
Waterman Waterbury Co., The 245
Watson-Stillman Co. 30
Webster & Co., Warren 69
Webster Engineering Co. 237
Weil Pump Co. 253
Welding Fittings Corp. ..... *
Western Engineering & Mfg. Co. 246
Westinghouse Electric Corp.,
Air Conditioning Div. 170
Westinghouse Electric Corp. ..... 16 & 17
Westinghouse Electric Corp.,
Sturtevant Div. 195
Weston Electrical Instrument Corp. 251
Wheatland Steel Products Co. 180
Wheeler Mfg. Co., C. H. ..... 24 & 25
White-Rodgers Electric Co. 145
Whitlock Mfg. Co. ..... *
Wiegand Co., Edwin L. 261
Will-Burt Company, The ..... *
Williams Valve Co., D. T., Div. of The Schaible Co. ..... *
Wilson & Co. ..... *
Wilson, Inc., Grant 134
Wing Mfg. Co., L. J. 221
Wolverine Tube Div. of Calumet & Hecla Consolidated Copper Co. 50
Worthington Corp. 172

Yarnall-Waring Co. 137, 218
Yates-American Machine Co. ..... *
York Corporation ..... *
York-Shipley 233
Young Radiator Co. 177
Youngstown Sheet & Tube Co. 36

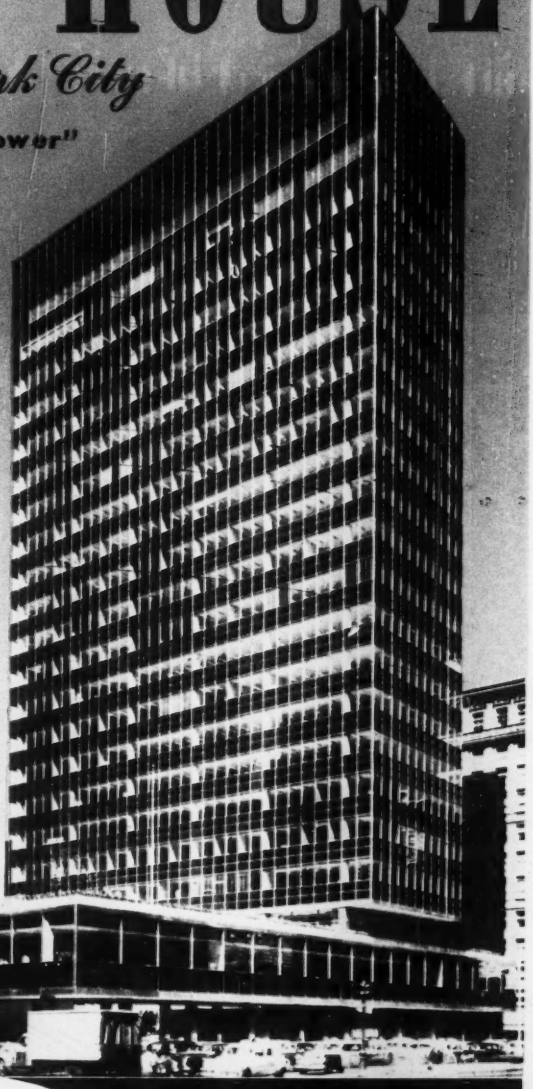
Zallea Bros. ..... *
Zonolite Co. 53
Zurn Mfg. Co., J. A. 33

Firms represented in this issue are identified by the folio of the page on which their advertising appears. Advertising which appears in other issues is marked with an asterisk.

LEVER HOUSE

New York City

". . . that Blue-Green Glass Tower"
Is another famous
CLARAGE *Installation!*



During the last 40 years Clarage has furnished much of the ventilating and air conditioning equipment installed in office buildings which house America's greatest business enterprises.

A recent installation requiring 27 Clarage ventilating fans is "Lever House," new general offices of Lever Brothers Company.

Lever House provides ideal working quarters for 1280 people. It has every comfort and efficiency advantage which expert planning and modern equipment can provide.

What does American business like about Clarage? . . . first, our resourcefulness in devising ways of meeting your particular requirements exactly — and, second, the ability of our equipment to operate faithfully and economically for a long time to come.

How may we serve your Company?

97 **OF AMERICA'S 100 LARGEST CORPORATIONS are users of Clarage equipment . . . This wide acceptance denotes the high quality and reliable performance of Clarage products.**

CLARAGE FAN COMPANY
627 Porter Street • Kalamazoo, Mich.

ARCHITECTS
Skidmore, Owings & Merrill

CONSULTING ENGRS.
Jaros, Baum & Bolles

VENTILATING CONTR.
Kerby Saunders, Inc.

You can Rely on...

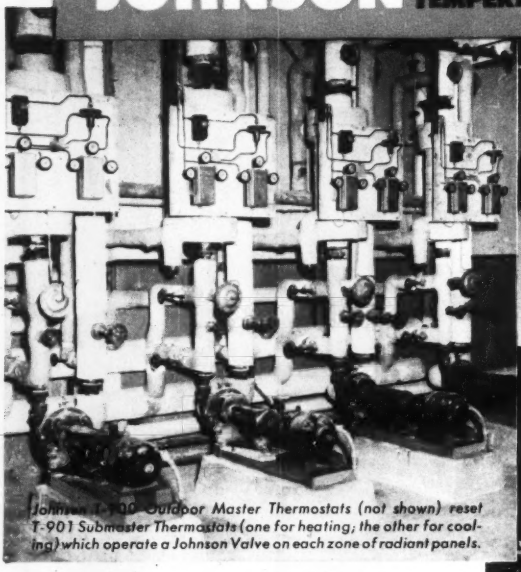
CLARAGE

Headquarters for Air Handling and Conditioning Equipment

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA Canada Fans, Ltd., 4285 Richelieu St., Montreal

GUARDING *an intricate heating-cooling system* ···

JOHNSON AUTOMATIC TEMPERATURE CONTROL



Johnson T-900 Outdoor Master Thermostats (not shown) reset T-901 Submaster Thermostats (one for heating; the other for cooling) which operate a Johnson Valve on each zone of radiant panels.

Head Office, Dominion Textile Company, Ltd., Montreal, Quebec. H. Ross Wiggs, A.R.C.A., architect, Montreal; Wiggs, Walford, Frost & Lindsay, consulting engineers, Montreal & Toronto; Connolly & Twizell, Ltd., heating contractors; W. E. Baxter, Ltd., ventilating & air conditioning contractors, both of Montreal.

Dominion Textile Company, Ltd., describing the heating and air conditioning system for its new head office building, Montreal, in a fine brochure entitled "A BUILDING AND A BUSINESS", says that "Guarding this intricate heating-cooling mechanism is an array of thermostatic controls both inside and outside the building." And, the "array" to which reference is made is a "planned-for-the-purpose" Johnson System of automatic temperature and humidity control.

"In many ways," the booklet states, "the new head office is one of the most modern office buildings on the continent. Its heating and air conditioning system is a fine example of engineering skill. In one combined operation, a variety of equipment provides air heating, air cooling and ventilation. Temperature control is effected in two ways; about 25 per cent of it by means of radiant heating (aluminum panels having copper piping in the walls below the windows) and the balance by temperature of the air in the ventilating system. These radiant 'heating' panels, incidentally, become 'cooling' panels in summer as cold water is circulated through them . . . Control of humidity is also a major job . . ."

Yes! There is quite an array of Johnson equipment in this interesting installation, applied to the radiant panels and to the 12 year-'round air conditioning systems which make Dominion Textile's head office the largest completely air conditioned building in Montreal. Moreover, it is the only building in Canada employing radiant *cooling* panels. Johnson T-900 Master Thermostats are an integral part of the automatic control apparatus. They measure outdoor temperatures and reset the Johnson T-901 Submaster Thermostats which, in turn, operate Johnson modulating Valves and Dampers on the heating and air conditioning systems.

Whether *your* problem demands an intricate control system or a very simple arrangement of thermostats and valves or dampers, ask a nearby Johnson engineer. There is no obligation. JOHNSON SERVICE COMPANY, Milwaukee 2, Wisconsin. Direct Branch Offices in Principal Cities.

JOHNSON *Automatic Temperature and Air Conditioning* **CONTROL**

MANUFACTURE • APPLICATION • INSTALLATION • SINCE 1885